

USER ISSUES IN NETWORK SERVICES

W. EUROPEAN 1991-1996

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USER ISSUES IN NETWORK SERVICES WESTERN EUROPE

1991-1996



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User Issues in Network Services Western Europe, 1991-1996

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Abstract

This report examines the issues affecting the users of all types of network services in Western Europe in 1991. The research was conducted to examine the issues inherent in three different situations, which may or may not coexist within any single organization.

- The user manages the network in-house but buys in specific contracted services or products to help in this task.
- The user has outsourced all or a major portion of the network management to an external contractor.
- The user buys in specialist network services to supplement the networks provided by either or both of the two previous methods.

Specific issues researched include the extent and diversity of use of external contractors, cost/benefit issues, integration of networks, network management tools, organizational structure trends, and satisfaction with services and products.

The research has resulted in the writing of a number of in-depth case studies of major organizations and their use of networks. The organizations participate in a number of industrial sectors: manufacturing, financial services, distribution, government, etc.

USER ISSUES IN - NEISI
NETWORK SERVICES 1991-96
W.E C.I

AUTHOR

TITLE

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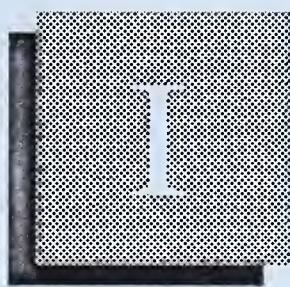
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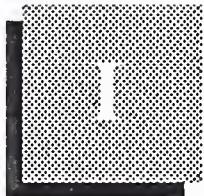
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Introduction

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Introduction

A

Objectives

This study is produced as part of INPUT's Network Services Programme—Europe. The objectives of the study are to:

- Examine the most important issues and concerns affecting the networking user community at this time.
- Understand the commercial and technological pressures impacting Western European networking.
- Identify a number of large and medium-sized users to act as case studies to illustrate different stages of networking development.
- Assess the requirements for marketing to the new opportunity areas that are emerging in the network services area.

B

Scope

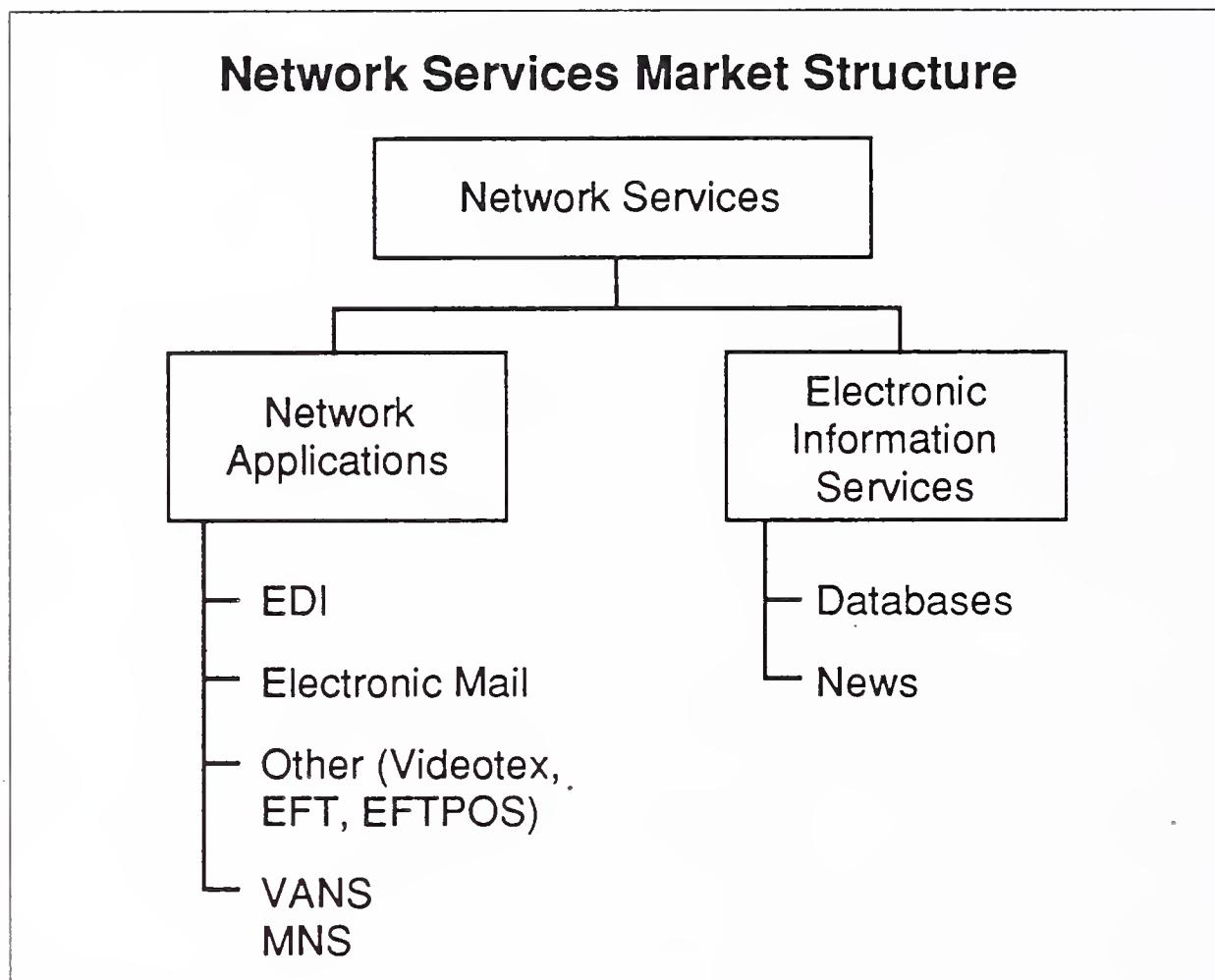
In previous years, INPUT has produced in-depth reports on the climate in Western European markets for specific major issues, by delivery mode and by country, but not an integrated Network Services Programme. In 1990, a number of key network services sectors were first researched by INPUT as a separate programme. This study is part of the 1991 Network Services Programme.

The study covers issues relevant to PTTs, independent services vendors and equipment vendors selling into the network services market.

Exhibit I-1 details the structure of the network services industry as defined by INPUT. The network services market is divided into two major segments. The first, Network Applications, includes managed network services and other VANS, messaging services and electronic data interchange (EDI) services. The second, Electronic Information Services (EI)

includes on-line databases and news databases. The fundamental criterion for services in this category is that the network itself must play an important enabling function, i.e. without the network the service could not be provided.

EXHIBIT I-1



C

Methodology

As part of its ongoing programme of research, INPUT interviews dozens of vendor and scores of users each year.

Specific to this study, INPUT undertook:

- Seven in-depth, formal, face-to-face interviews using the user questionnaire in Appendix A, four of which have been included as detailed case studies in this report.

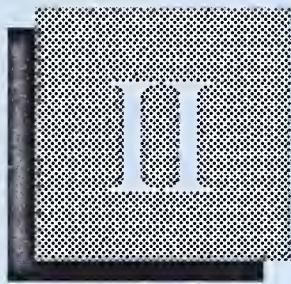
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Study Contents

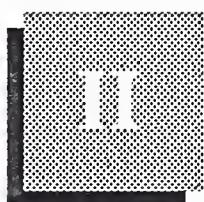
The study is organised into four chapters and one appendix as follows:

- Chapter II is an Executive Overview of the complete report. It is designed for the executive or individual who wants to quickly identify the salient points of the report without reading it in its entirety.
- Chapter III reviews the network issues by including detailed profiles of six major users in Western Europe.

- Chapter IV reviews the user environment and assesses the network strategies required to support corporate networking as it progresses into a technically more complex era.
- Appendix A details the user questionnaire used in this research.
- Section A in your binder gives INPUT's definition of terms, and lists the exchange rates and inflation assumptions used in compiling this report.



Executive Overview



Executive Overview

A

Network Users Face Critical Decisions

The majority of network users throughout Western Europe are preparing to face major decisions within the next two to three years relating to the upgrading of their current facilities. These decisions will appear particularly difficult for two classes of users.

- Those who as multinationals already trade on a pan-European scale,
- Those successful smaller companies whose growth plans include breaking out of the national mould to extend their operations across other European countries.

Both these categories of users are going to be faced with the patchwork of European network bearer (or common carrier) services presented by the national PTTs—the first when addressing the problem of upgrading the bandwidth available to them through leased lines, and the second when faced with putting together the new international links they will require.

The importance of these decisions needs to be set in context. Exhibit II-1 illustrates the rapid growth of the network services market in Western Europe over the course of the next five years. This chart shows the top level breakdown, which INPUT uses in this market sector, between Network Applications (including E-mail, EDI, videotex and managed network services) and Electronic Information Services (which include Reuters Monitor services and their equivalents from Telerate, Citicorp, Extel and Quick, as well as the specialist services provided by credit bureaux, marketing research agencies and on-line database vendors). The overall growth rate (CAGR or Compound Annual Growth Rate) of 25% pa. is composed of individual sector growth rates ranging between 19% and 35%.

The rapid growth of the network sector, which is much higher than most other segments of the information services (IS) industry, reflects the increasing importance of networks to the average user, both of in-house computing and of external network or processing services.

- After the explosive growth of desktop computing in the 1980s, the 1990s will be marked by equally explosive growth in the usage of interconnected PCs.
- Following the pattern of interconnecting PCs within large organisations to form local-area networks (LANs), there has come the need to interconnect the LANs themselves, which are heavy users of data communications—10 Mbps for an Ethernet LAN, up to 16 Mbps for a Token Ring and a formidable 100 Mbps for an FDDI fibre optic network.

EXHIBIT II-1

Market Forecast Network Services 1991-1996

Subsector	1991	1996	1991-1996 CAGR (Percent)
Network Applications	1.4	5.9	33
Electronic Information Services	3.1	7.9	21
Total	4.5	13.7	25

Though the fastest growth in networking is coming from the data communications side, the use of voice communications is also on the increase with newer applications such as:

- Voice messaging,
- Touch-tone telephone voice output systems,
- Automated call distribution (ACD) systems,
- Mobile applications.

Thus enormous pressure is being exerted on the communications infrastructure, in terms of the demand for basic transmission facilities, at a time of increasing competition. This pressure is due to sweeping, or creeping, liberalisation in telecommunications, as well as to competition in all other service and manufacturing industries throughout Europe. New technologies are being put in place by the carriers and PTTs in response to this demand. Inevitably in the European context, the installation of new bearer services technologies will be at an uneven pace and in a non-harmonised fashion.

This report deals with the impact of this supply/demand structure on the decisions facing user network managers, and develops recommendations for the vendors supplying them. The impact is dealt with in four areas:

- Application issues,
- Technical issues,
- Commercial or cost issues,
- Organisational issues.

The vendor recommendations are handled through the medium of a set of sector positioning parameters affecting vendor strategies in operating in these new opportunity markets.

Exhibit II-2 summarises the key issues impacting users in 1991.

EXHIBIT II-2

Major User Issues

- Approaching technical decisions
- Growing data usage
- Hungry applications
- Cost squeeze
- Skill shortage
- Management control

B

Applications Issues

It is the increased demand from digital data communications that is the main driving force at the present time. The new application areas that are creating this demand often require some form of local-area network (LAN) to support them. The spread of powerful PCs and technical workstations in Europe has followed the same pattern as in the U.S.A. First comes the need to interconnect users at one site working on the same project. Secondly, groups of similar workers at other sites or in other plants start to benefit from having their LAN connected into the others. This can be done by using wide-area private or public networks and has in recent years been made more simple by the availability of specialised devices to enable this very function:

- Bridges connect LANs of the same class and effectively make more than one LAN act as one network.
- Routers are used to connect a LAN with a number of different LANs of different classes (e.g., Ethernet to Token Ring) across wide-area network links.

Exhibit II-3 summarises the current issues affecting network management, with high demand pressure coming:

- Immediately from engineering applications where work groups need to pass information between personal and group databases,
- Very shortly from the spread of X-Windows technology into the office environment,
- The increasingly attractive videoconferencing option, which is currently being used instead of face-to-face meetings to defray travel and hotel costs.

In order to conserve the valuable management resources available to manage the IS function, many MIS directors are organising their departments into two areas:

- Computer Services run the day-to-day production operations.
- Systems Development is responsible for the design and build of new systems and the support of the existing ones.

EXHIBIT II-3

Applications Issues

- LAN interconnections
- Engineering integration
 - Team computing
- Office systems
 - X-Windows
 - Videoconferencing
- Valuable management resources
 - Applications versus infrastructure

Exhibit II-4 illustrates the layered system elements, which logically fall into one or other area.

This functional split allows management to uncouple the applications (vital to the development of commercial competitive edge) from the supporting IS infrastructure (which requires a less enterprise-specific approach). The functional split allows applications to respond to the changing business dynamics, while the infrastructure as a supporting foundation can be planned for maximum stability and return on investment.

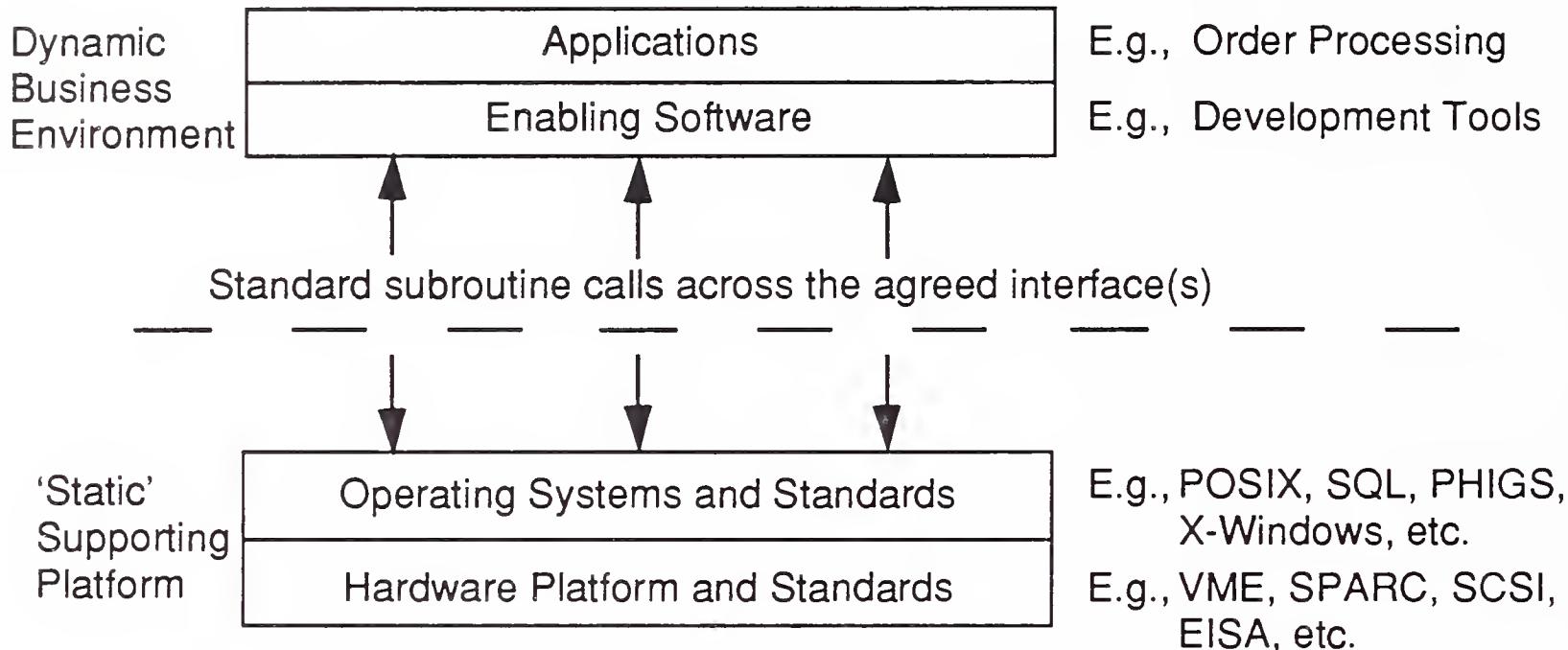
This functional split also introduces the possibility of using major contract outsourcing on either side of the functional divide:

- Systems Integration contracts enable large new applications to come on-stream swiftly and effectively,
- Systems Operations contracts can be applied at a number of levels:
 - Data centre operations only,
 - Network infrastructure,
 - Combined network and data centre.

Outsourcing of network operations management is of increasing importance in Western Europe for the single European market, which will come into force during our forward five-year period.

EXHIBIT II-4

Uncoupling Applications from Infrastructure



C

Technical Issues

The advent of new technologies now being applied to telecommunications is causing the infrastructure available to users to be in a state of perpetual change. Technologies such as ISDN, fast packet, frame relay, optical computing, to mention a few, are all jostling for the attention of the telecommunications manager.

INPUT's study, *Opportunities in ISDN and Other Emerging Technologies, 1991-1996*, to be published in the summer of 1991, deals with these issues in depth. Suffice it to summarise at this point a number of key issues of concern to users:

- With very few exceptions in the way of liberalisation, Europe is a "mosaic" of PTT-dominated countries. Although CEPT and ETSI, the CEPT standards creating body, are working towards harmonisation, for the telecommunications managers interviewed by INPUT, "Europe" remains a barrier towards the easy spread of their network.
- Integration between voice and data remains a technical issue for a few large users who have not yet gone down this route. Integration of image and video into the system is still largely untried except by the large corporate pioneers.
- For many in-house telcomms teams, bandwidth management is the key activity with which they will be engaged in the next few years.
- The technical abilities of vendors to offer comprehensive networking services are in question.

Exhibit II-5 lists the current technical issues in users' minds.

By contrast with the IS side, telecommunications managers do not see the multivendor aspects of the market as significant issues. Most networks of any size have been using equipment from more than one major supplier for as long as they have been in existence.

EXHIBIT II-5

Technical Issues

- Europe a mosaic
- Integration of networks
- Band with management
- Question vendor capabilities
- Multivendor issues

D**Commercial Issues**

The chief commercial issue, and one that is always of top significance to the corporate telecommunications manager, is that of cost. Telecommunications is still regarded as an infrastructure cost centre, something that should provide the best service at least cost and not be a problem for management. At a time of recession, this cost pressure from management becomes even heavier.

INPUT found that communications budgets are increasing consistently with time, due to increased usage from data, voice and other media. Budget increases measured ranged from 10% to 30% p.a., with values as high as 60% p.a. being registered for specific services, such as those involving linkage between private and public networks i.e., "break-in" and "break-out" services. (Breaking in means initiating a call from a terminal attached to a public network and routing it to a destination inside a private network. "Breaking-out" is the reverse, i.e., starting inside the private network and ending at a terminal connected to the public network.)

The issues raised by liberalisation in a European context centre on the cost balance between:

- Private networks in which costs can be reasonably well forecast on an annual basis,

- Public service networks in which infrequently required facilities can be obtained on an on-demand basis.

Resale of basic transmission and linkage between public and private networks to form what are called hybrid networks are key parameters affecting this cost equation.

One strategy being adopted by some communications planners in order to keep ahead of the inflating budget problem is to squeeze the maintenance expenditure. This is done by replacing networking equipment more frequently and expecting higher availability figures from each new generation of devices. This, in turn, justifies negotiating lower prices for maintaining the new kit.

There is a danger with this policy if it is pursued in parallel with the employment of an independent maintenance company. The independent maintainers specialise in maintenance and in the provision of spare parts. Squeezing their already slim margins during a recession will increase the rate of business failures of this group of companies, which only command at best in Europe 10% of the market. Thus, the users start to be driven back into the arms of the major suppliers at a time when they are increasing market share and product coverage.

Exhibit II-6 summarises the commercial issues at work.

EXHIBIT II-6

Commercial Issues

- Value for money
- Liberalisation across Europe
- Hybrid network issues
 - Resale
 - Break-in/break-out
- Maintenance squeezed

E

Organisational Issues

The key organisational issues of current interest to users are listed in Exhibit II-7.

- In large and very large organisations it is usual for the reporting structure for telecommunications responsibilities to be unified:
 - In the very largest organisations (those with over 10,000 data users and over 100,000 telephone handsets) this single responsibility line usually runs in conjunction with a centralised policy to use a group communications department.
 - In large organisations (those with over 2,000 data users and the equivalent number of handsets), a more decentralised policy is usually in force. This can mean that the central communications function is in competition with external contractors for communications projects in individual divisions or subsidiaries. This is the position into which many internal IS departments were put at the beginning of the 1980s.

EXHIBIT II-7

Organisational Issues

- Reporting structure
- Management background/pedigree
 - Traditional voice versus data split
- Staff area
 - Skills
 - Careers

- In medium and small organisations (those with between 2,000 and 500 data users, and those with under 500, respectively) responsibilities are more likely to be divided between voice and data:
 - Voice, together with other standard technologies like telex and fax, comes under general, administrative or office management,
 - Data, and other advanced technologies such as video and mobile communications, are the responsibility of the IS function.

INPUT found that the career backgrounds of the senior executives in charge of communications affected the policies pursued, particularly with regard to:

- Outsourcing of network management responsibilities. A manager from an IS background was more open to the possibility of relinquishing day-to-day control of his networking to a Managed Network Services vendor in order to have more time to manage the problems associated with application development.
- Employment of trained communications staff. A telecommunications manager with a telecommunications background was not so likely to feel uncomfortable with running a separate but small group of specialists, since he would understand their career and job satisfaction needs.

The other major issue in this area relates to the shortage of trained and experienced communications staff:

- It is difficult to offer a suitable career structure (in anything but the very large organisations, less than 15 specialist staff was the normal complement).
- The split between the voice and data communications staff in terms of their technical backgrounds needs to be bridged if organisations are going to be able to take advantage of the new opportunity offered by networking.

F

Vendor Recommendations

The networking services market is wide open for any type of vendor to bid for the leadership position within it. Several types of suppliers with different backgrounds are currently serving the market. Their backgrounds bring different skills to bear upon the set of problems facing corporate communications managers:

- PTTs and other carriers possess size and service experience, but are limited by their national perspective and often hampered by their monopoly status.
- Network hardware vendors are often large, multinationals whose products have evolved to service the public sector switching requirements of the national markets in which their ownership resides, e.g., Alcatel services the French network, Siemens the German, AT&T the US; but they are handicapped in the services sector by an equipment vendor's product orientation.

- Computer equipment vendors have a more international product set and outlook but are also perceived as more interested in product than service. Their professional services operations have reasonable track records in the systems integration area but are not yet valued for their ongoing operational contracts.
- Value-added networks services (VANS) providers have many of the necessary attributes, being totally services orientated and already active in the market with applications services. They are, however, handicapped in the eyes of the corporate telecommunications manager by being somewhat narrow, somewhat specialised, essentially a “bureau”. What the manager is essentially looking for currently are infrastructure services (see Exhibit II-4 in section II-B of this chapter, where we illustrate the key importance of activities on either side of the applications—infrastructure divide).
- Professional services companies offer a complete range of systems integration options, but with notable exceptions: Andersen Consulting and CGS's Hoskyns are not known for their operational management services. All but the largest vendors in this class suffer from insufficient size, lack of visibility and a perceived long-term viability problem.
- A smaller group of vendors from another specialist area is the Independent Maintenance companies. This group has aspired to have a serious role in the network services and network maintenance businesses. Although well-placed to secure contracts that include network equipment maintenance in multivendor situations, they need to diversify if they are to be able to offer a broader range of services, including infrastructure and applications services.

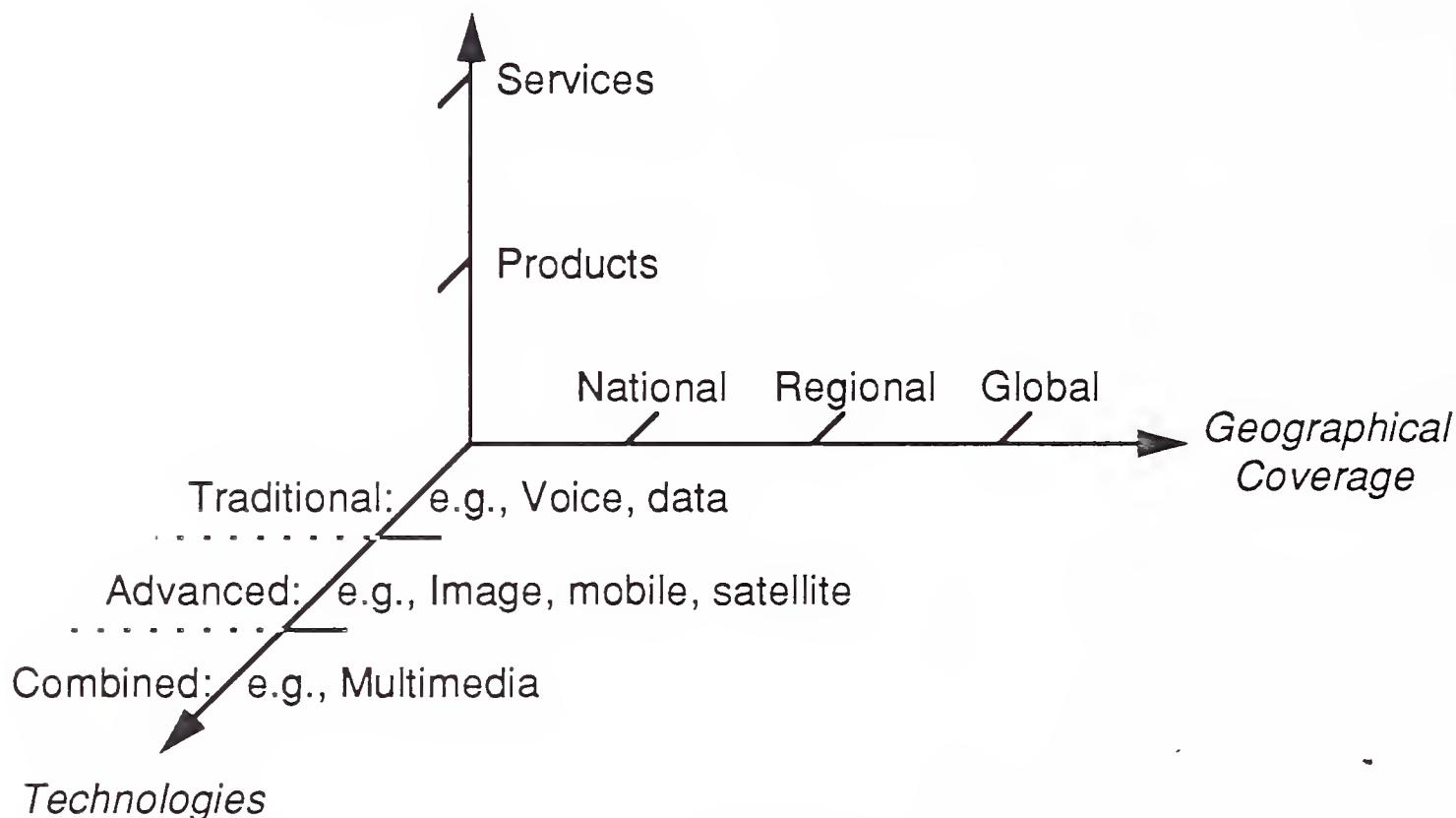
Exhibit II-8 depicts the three important service positioning axes which vendors should use to measure or assess their current market stance:

- A product versus service approach is key to whether the portfolio is broad enough or, in turn, maybe too broad.
- Technology is important in terms of not only what is on offer, but also of how the offering will be perceived. The traditional split between voice and data will be eventually “soldered over” by the adoption of ISDN as the basic standard and by the evolution into “multimedia” applications. Meanwhile, the split runs very deep into every aspect of communications, impacting strategy and staffing aspects most heavily.
- Geographical coverage of market offerings is an increasingly important parameter and is affecting companies further down the organisational size pyramid more and more as markets move from being national to regional (e.g., European), and even global.

EXHIBIT II-8

Positioning Parameters

Type of Offering



Vendors should study the positioning diagram and establish their own current and preferred future positions in its universe. Understanding the positions of competitors and competitor groups is also important. These recommendations should be established as part of a formal marketing exercise.

Exhibit II-9 summarises INPUT's key recommendations to vendors.

EXHIBIT II-9

Vendor Recommendations

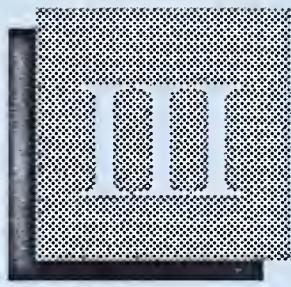
- Positioning
- Reinforce product/service gaps
- Alliances
- Tracking

The knowledge of one's own and one's rivals' positions leads into the process of reinforcing the gaps in the service product portfolio that are highlighted by the positioning exercise. The two classic ways of improving position can both be used, either singly or in combination:

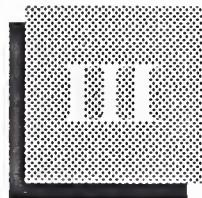
- Organic diversification using existing in-house resources is slow, especially for smaller organisations, and is unlikely to produce a coherent strategy unless management resources are carefully husbanded.
- Acquisitions are faster but may be hard to integrate unless strategy has been carefully thought through.

Temporary alliances with competitors, or better still with vendors whose expertise is complementary to one's own, either on a project or on a sector basis, offer a third option in cases where neither of the other two are possible. These alliances can prove fragile or, on the other hand, unproductive unless each party has understood and taken account of the longer-term interests of the other. In many cases, they "wither on the vine" because the objective was more cosmetic than strategic, i.e., a vendor thought it needed to be seen to have a presence in a particular sector and came by the quickest and safest route to obtain this presence.

In the networking market of the 1990s, the key component of a marketing strategy is to have in place a programme that will allow for changing user needs and changing user attitudes to be tracked continuously. This sort of programme should be formal and invoked regularly to include not only a sample of the existing customer base (often undertaken by vendors as an annual or quarterly satisfaction survey), but also samples from competitors' user bases and from non-users.



User Case Studies



User Case Studies

A

Introduction

The objective of this chapter is to highlight the key features of a number of user situations existing in the marketplace at the current time. With the small number of users INPUT is profiling, it is necessary to be selective in a useful way. The users chosen are representative of as many different aspects of the current market as is feasible in a small sample; at the same time, each user has a clear position relative to the question of outsourced network management.

The users were chosen to represent a range of revenue sizes and networking maturity. Industry sector was not a discriminate factor used in the selection process, although INPUT recognises that in certain countries in Europe, notably France, most IT products and services are now sold either with an industry-specific feature content or by industry sector-oriented sales teams.

B

Confederation Life Group of Companies

1. Company Background

Confederation Life is the fourth-largest insurance and assurance company in Canada and is rated by independent analysts as the fastest growing, with a growth rate in terms of aggregated premium and deposit incomes of 25% per annum over the last eight years. Headquartered in Toronto, Ontario, the group obtained premium and interest revenues in 1989 of C\$5.7 billion (U.S.\$ 4.9 billion) with a profit after tax of C\$103 million (U.S.\$89 million).

The group is organized on a worldwide basis into three geographic regions, covering:

- Canada, where Toronto houses both the group and the Canadian headquarters.

- U.S.A., in which the headquarters are in Atlanta, Georgia,
- U.K. (and Europe), where the operation is run from a head office in Stevenage, Hertfordshire.

Although Europe is theoretically covered from the U.K., in practice all Confederation Life's customers are U.K.-based, and inroads into Europe are not in the company's plans at this time. The rationale for this approach is:

- Insurance products are essentially national in character,
- The company claims to have no more than 1.2% of the U.K. sector and wants to concentrate on expanding its market share where it is already established.

The company's premium and deposit incomes in the U.K. for 1989 amounted to £1.7 billion (U.S.\$3.2 billion.) The company has a U.K. staff of 1,500 comprising 460 in head office, 800 salesmen covering the whole country from 46 branches, and the remainder (some 250 persons) forming branch administrative and marketing staff. The U.K. operation represents the largest geographic slice of the group's business.

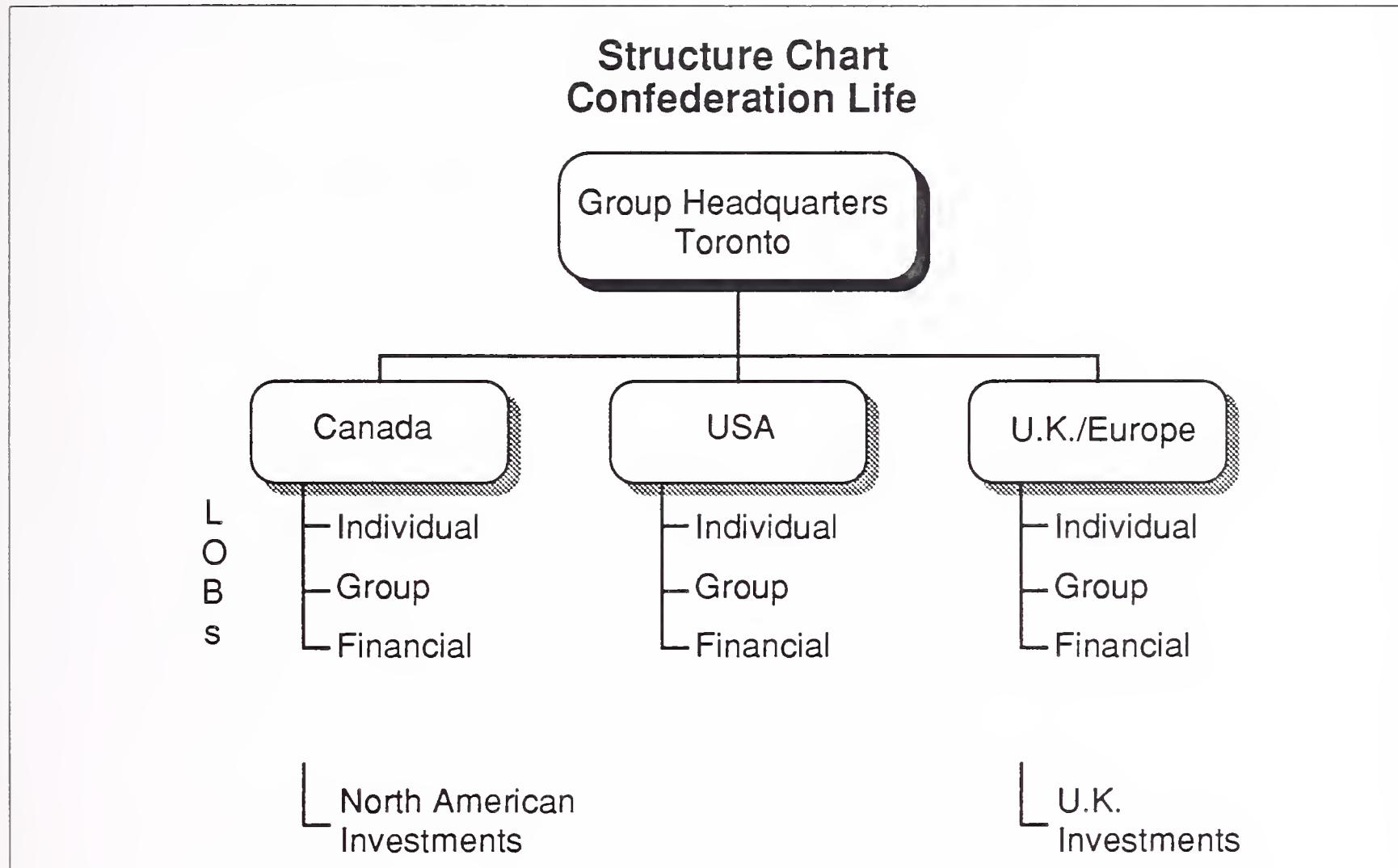
Confederation Life has three lines of business:

- Individual assurance covers policy marketing to the consumer market and operates through the branch network.
- Group assurance covers a range of insurance policies and other activities undertaken on behalf of companies, e.g., their pension fund management, offices insurance and health insurance schemes for their staff.
- Financial division covers the non-insurance financial services activities, including mortgage lending and banking. The company claims to have been the first in the U.K. to have set up a banking subsidiary from scratch. After two years it now has £150 million (U.S.\$280 million) of funds deposited with its banking division.

These three sets of activities are all underpinned by an Investment Division that is based in the City of London and works closely with its counterpart in Toronto, which covers the North American money markets and securities exchanges.

Exhibit III-1 summarizes the organizational structure in a simple diagram. The remainder of this profile is concerned mainly with the U.K. operation, which is the part of the group's activities covered by the scope of our report.

EXHIBIT III-1



2. Networking History

Confederation Life has been established in the U.K. for over a decade but has only been a mainframe user since 1983. Up to that time the U.K. operated with a Remote Job Entry (RJE) terminal system connected in batch mode to the Toronto data centre. Hence an international link was involved right from the start, with the U.K. applications being run on the Toronto machine. Currently 60% or more of the applications have been brought back to the U.K. to reside on the IBM mainframe in Stevenage. (The group runs both IBM and Amdahl systems.) It is hoped to increase the percentage of U.K. applications running at Stevenage to reach the 95% level within the next two years.

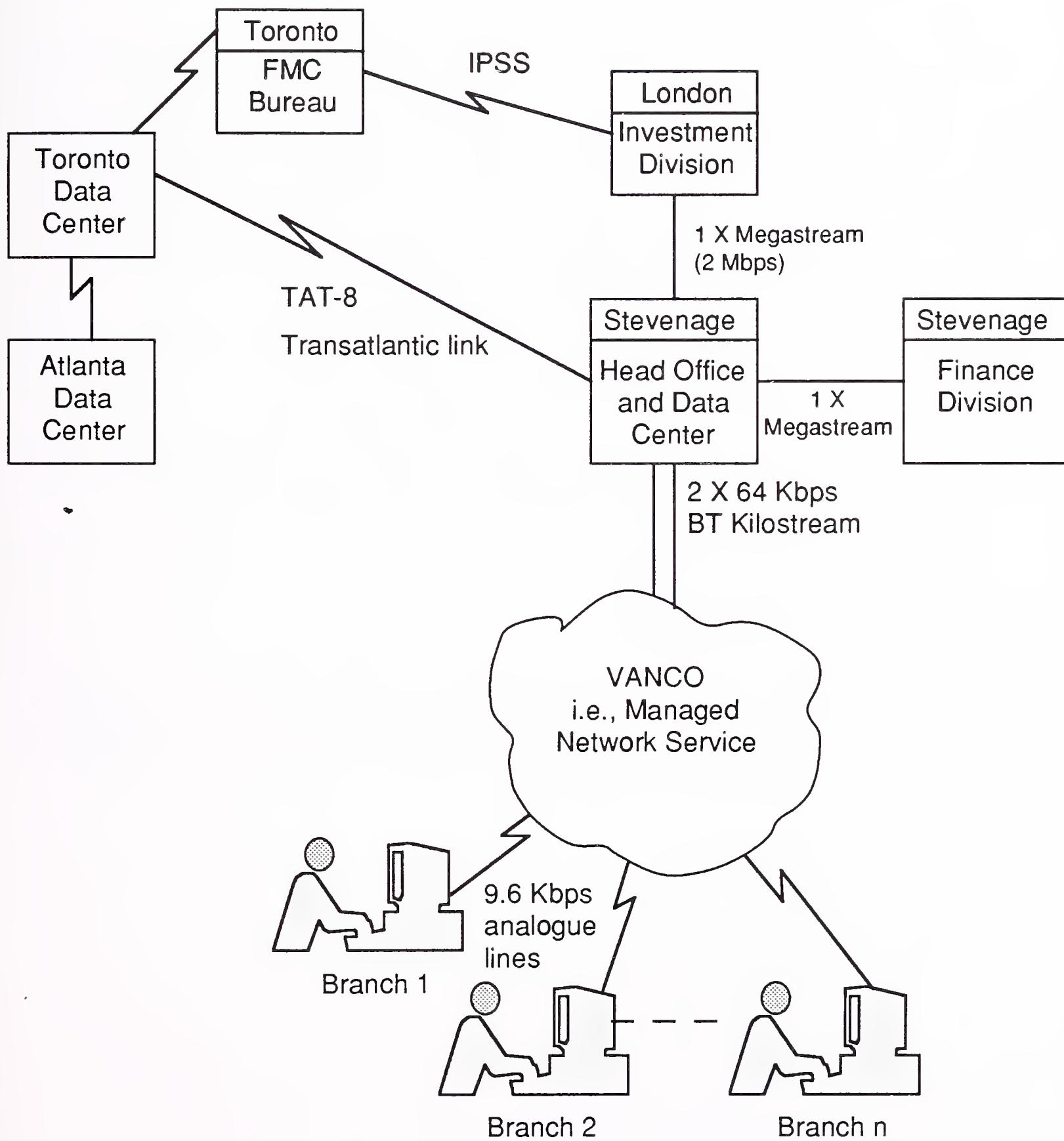
Exhibit III-2 shows the extent of the company network in relation to the U.K. operations. The main features are:

- The use of a managed network service (VANCO is the current supplier) to connect to the (currently 46) branches in the U.K.,
- The use of a private international leased line going via the TAT-8 transatlantic cable to communicate with group headquarters and with systems still resident on the Canadian data centre,

- The connection via IPSS (BT's international packet switch service) between the London-based investment division and a Canadian bureau called FMC supplying specialist investment management systems, which are also used by the North American investment division,
- Traffic between Stevenage and London, which consists principally of internal electronic mail on the data side and 24 voice channels. A Megastream link is in place.

EXHIBIT III-2

Network Diagram Confederation Life



Up to 1984 the worldwide operations were centralized on Canada. Since then a policy of supplying regional products has lead to the separation of the U.K., the U.S.A. and Canada, each with its own profit centre and data processing infrastructure. This policy of regionalisation determines the overall network structure but leaves each region free to determine how to satisfy its own regional requirements.

In 1987 Confederation Life first moved to the use of a managed network. IBM's Managed Network Service (MNS), based on computers in Warwick, U.K., was employed for three years, after it became clear that something of the order of at least £100,000 (U.S.\$200,000) for networking hardware upgrades alone would be required to handle the expansion of the company's branch network. In the autumn of 1989 the requirements were reviewed and a new supplier of a managed network services was chosen to start a contract from March 1990. The two principal factors influencing the change of supplier were:

- The new supplier, VANCO, of Isleworth, Middlesex, U.K. was offering a more flexible service.
- IBM's charges were increasing as a function of the volume of transactions being processed, whereas VANCO's were subject only to a flat fee pro rata to the number of branches involved.

3. Interview Data

a. Responsibilities

INPUT's respondent was the Computer Services Officer (CSO) reporting directly to the Director of Administration, who besides being responsible for the two wings of the IS function, Computer Services and Application Development, has another four functions to administer. The CSO controls the following functions:

- Data Centre,
- Data networking,
- System software,
- Database administration,
- Information Centre

Computer Services has a staff of 28.

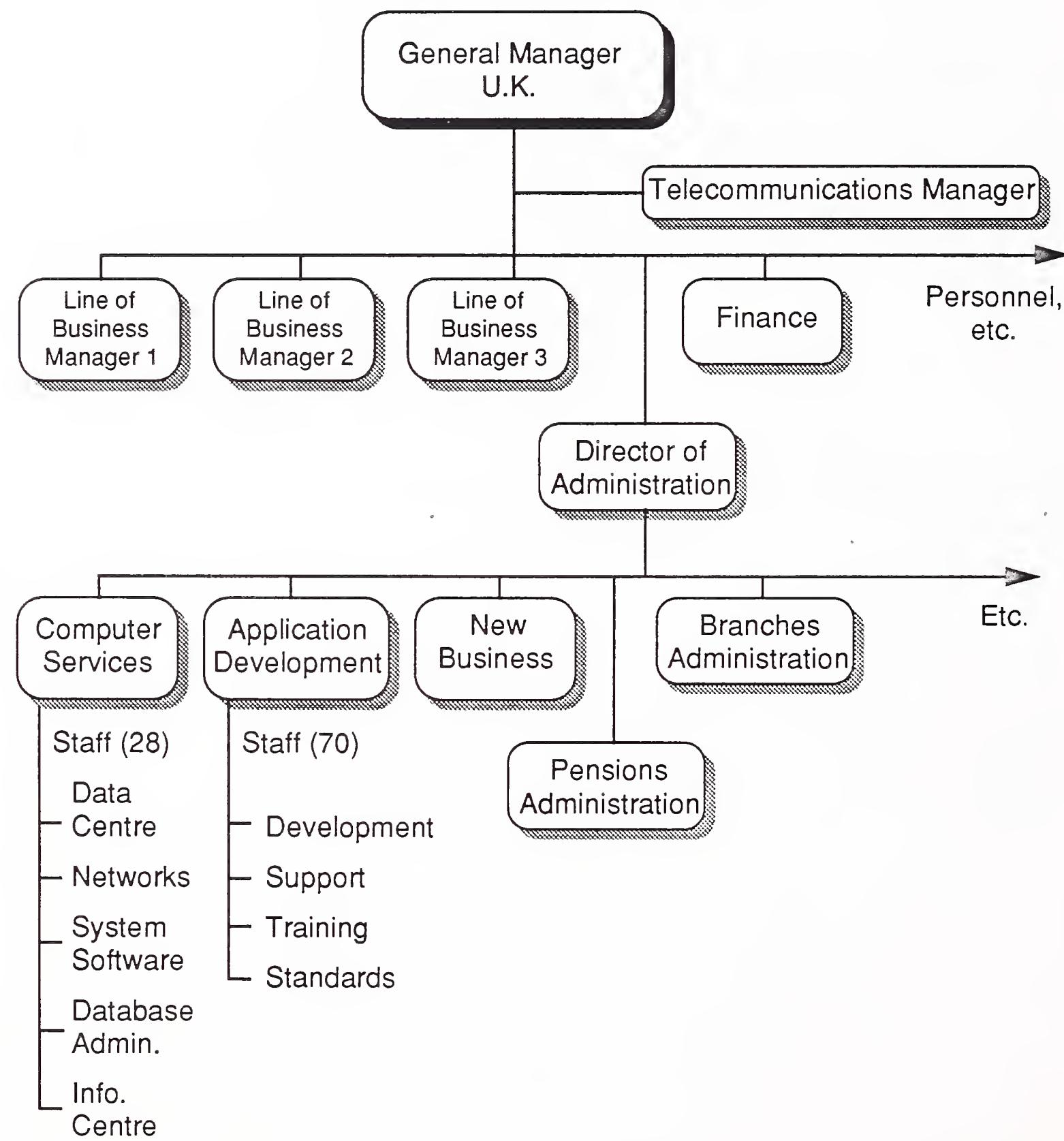
The Application Development manager, with a staff of 70, is responsible for:

- Application support,
- Training in all IS functions and applications,
- Standards.

Voice Communications come under another manager who reports directly to the General Manager and has his own budget and staff. Voice and data are multiplexed across the TAT-8 transatlantic link and across the Megastream link connecting head office into the Investment Division. The company runs its own private voice network within these two buildings in the U.K. incorporating fast dial codes and other convenience features. The branches are served via the PSTN, and some key systems are now being installed. It is not anticipated that this split of responsibility will change within the next five years. Exhibit III-3 illustrates the relevant parts of the organizational structure involved in maintaining and servicing the networks.

EXHIBIT III-3

IS Organisation Chart Confederation Life



b. Expenditure

VANCO Limited is the main contractor to Confederation Life in the networking field. Due to the growth in business volumes and the regular opening of new branches, the charges for networking are rising regularly. The managed network fees have risen from the £21,000 (U.S.\$41,000 approximately) being spent in the spring of 1990, when 39 branches were on-line, to the current figure of almost £27,000 (over U.S.\$50,000) a year later. The year-on-year growth is at a rate of just under 24%.

The managed network accounts for between 60% and 65% of all data networking costs, with the rest accounted for principally by the cost of leasing the TAT-8 line and other access and usage charges for use of the public networks. Minor items in the budget are:

- Amortization and maintenance on the modems, which are maintained by a sister company of VANCO,
- Staff time, which is approximately half a person dedicated to the fielding of first line queries and to the design and management of the in-house LANs.

All told, data networking represents just under £0.5 million (U.S.\$1 million) out of a total DP budget of around £4 million (U.S.\$8 million), i.e., it runs at a 12% of budget level.

Approximately another £0.2 million (U.S.\$0.4 million) is spent on voice communications, including rental of megastream lines, maintenance of PABXs, call costs and staff. Savings in line and call charges are being planned for the voice side in order to keep pace with the escalating number of calls and the inevitable PTT rate increases. Two tactics are being used:

- Moving from BT to Mercury lines wherever possible,
- Monitoring outgoing calls from the branches in order to get some measure of outgoing call volumes. At present only call volumes going out from the sites with PABXs are known, i.e., from Stevenage and London.

Costs mentioned so far have related to wide-area networking. Two LANs are also currently installed, both IBM Token Ring; one is at head office, the second in the London investment office. Plans are underway to connect them via the megastream link in order to have an internal backbone covering all head office functions.

c. In-house Functions

Data networking staff are deliberately kept to a minimum. The estimate is that half of an operational analyst's time is spent:

- Filtering users' problem calls and passing onto VANCO those which cannot be handled,
- Looking after user terminal and cluster equipment.

All other aspects of the day-to-day management are handled by the managed network contractor. This is rated as the number one benefit of using a MNS—lack of involvement, staff overhead kept to a minimum, etc.

Two network management tools, both from IBM, are in use:

- The local-area networks run under LAN Manager,
- NETVIEW runs on the mainframe to monitor the usage of the 3720 front-end processor.

The company is pretty satisfied with the IBM support provided at the Customer Representative and Systems Engineer (SE) levels, where in both cases specific persons are assigned to it.

d. Outsourcing Benefits

As a result of discussing his networking solution with his counterparts in other insurance companies, our respondent is convinced that outsourcing is a current trend and made a number of observations:

- Growing companies run out of networking resources when they try to grow their in-house networks beyond a certain size.
- Only the very largest companies can offer network specialists an adequate career path.
- Networking as part of the IS infrastructure is most satisfactory when not subject to change, whereas DP applications contribute most to the organization when they change to match the changing business environment.
- Not many insurance companies have all their branches on-line as does Confederation Life.

The advantages of the VANCO service over the IBM MNS are in the areas of:

- Uptime guarantee above a specified threshold,
- On-line monitoring with automatic dial-up when a suspect line is detected,
- Flexibility of usage, e.g., out of normal office hours,
- Flexibility of the customer interface relationship.

Cost savings are estimated to be 7% per annum over what the company could expect to have paid if it had still been using its previous supplier. The financial savings are also the primary reason why a managed data service is used.

Consideration has been given to having a complete facilities management. This has been rejected at an early stage of consideration and for a number of reasons:

- Unhappiness with loss of control,
- Fear of falling behind in terms of technology. "It is not in the interest of the contractor to update the hardware and operating software platform being used."
- Increasingly operating software is linked to the hardware, e.g., with the ESA systems from IBM. Performance tuning requires and benefits from in-house control.
- According to a Norton & Nolan survey covering 400 to 500 sites worldwide, Confederation Life is some 35% better than the average site in the sample in terms of database response performance.

4. Key Aspects

Use of the managed network service is confirmed as being the correct policy for the company, with the number of branches on-line being a key factor in the requirement specification. Some of the older established and larger insurance companies were known to be still operating without branches on-line.

A second key factor is undoubtedly the fast growth of the company, which is likely to be found in other new arrivals or new entrants to the U.K. insurance market. By contrast, some of the older U.K.-owned companies have grown their networks in-house and have an established core of networking specialists. These companies perceive less need for a

managed network service and would normally only need to use discrete networking services, such as consultancy or training.

Another inhibitor to the use of a managed service would come from the unwillingness of a company to upset its key networking specialists by suggesting or moving to the outsourcing concept.

Confederation Life is a fast growing and dynamic company whose computer operations are organized along the lines of a simple split between:

- Operations.
- Application development.

The networking solutions currently in place reflect the background training and technological preferences of INPUT's respondent, who is one of the key decision-makers.

Exhibit III-4 summarises the key networking aspects for this particular user.

EXHIBIT III-4

Key Aspects - Confederation Life

- Cost-savings
- On-line branches
- Growth of activities
- Growth of traffic volumes
- Simple solution, no headaches
- Decision-maker's background

C

Ford Motor Company
Limited

1. Company Background

The Ford Motor Company (Ford) is the world's second-largest industrial corporation and the second-largest motor company owned in the U.S.A. It had a worldwide revenue of more than \$96 billion in 1989, and employs over 360,000 staff worldwide, of which 115,000 are employed in Western Europe. European revenues were an estimated \$32 billion in 1989.

Ford is organised in Western Europe into a series of national companies that all work under one executive team. Within Ford this is known as the concept of Ford in Europe. The Systems Division at Warley outside Brentwood, Essex in the U.K. is responsible for systems deployed throughout the whole of Europe. The senior systems executives are housed at Warley. INPUT's respondent is responsible for European network design, installation and support, and reports to the Systems Manager for Europe, who in turn reports to the Vice-President of Finance for Ford in Europe.

Ford has effectively three lines of business, which are:

- Automobile manufacture, and distribution through a third-party network,
- Heavy vehicle manufacture, i.e., trucks, agricultural and other industrial vehicles,
- Financial services including the provision of credit finance for the purchase or lease of vehicles.

The Ford networks are now integrated so as to serve all facets of the business.

Ford's company structure has been traditionally based around different factories or plants, each supplying different subsystems, parts or whole vehicles. This organisational structure, which is sometimes referred to as the "chimney type of organisation", implies a certain degree of autonomy among the different division and different plants, each of which has to do business with its fellows in order to produce the final end products to be marketed.

Current management thinking is looking for ways of improving efficiency as a high priority in a recessionary climate. One way of obtaining greater efficiency is to encourage a more "holistic" approach that involves more cross-fertilisation of ideas among people and more cross-adaptation among products. This approach counters the parochialism that can grow in the former type of organisation. The increasing use of networking is obviously a prime mover in this process.

A number of new systems developments are acting as driving forces to the increasing use of networks:

- New dealership systems,
- Extension of the use of EDI among suppliers and dealers,
- Introduction of office automation into the manufacturing environment.

2. Networking History

Ford has operated a number of wide-area networks (WANs) for a considerable time. Originally the car manufacturing and engineering divisions ran a separate worldwide network from the heavy and agricultural vehicle divisions. These two networks were amalgamated at the beginning of the 1980s. Since then the organisation in Europe has developed a number of networks dedicated to individual functions:

- Private voice,
- Administration,
- Office automation,
- Engineering,
- Distributors and dealers.

During the late 1980s a programme to integrate these networks was put in hand and this has meant that the central company backbone has been built around the TDM-based administrative network connecting the three major data centres in the U.K., Germany and Spain. The present architectural approach is to maintain one physical backbone that supports a number of logical networks dedicated to individual functions. These individual networks can vary in size, topology, protocols and volume of traffic.

A major upgrade to the private voice network was due to go on-stream very shortly (in the spring of 1991). This involves a fully pan-European implementation of primary rate ISDN and will act as another step along the way of closer integration across different information types—voice, data and image. Use of ISDN on a European scale involves digitalisation of all the circuits involved. The company believes this will be the first truly pan-European implementation of ISDN.

Another major implementation, which started in the late 1980s and is still ongoing, is the creation of a company-wide network of linked local-area networks (LANs). These are TCP/IP-based implementations that originate at plant or office level and are particularly orientated towards the handling at intraplant and interplant levels of engineering and design data, e.g., CAD/CAM files and technical documentation. The implementation involves the use of bridges and routers, and the backbone for trunking.

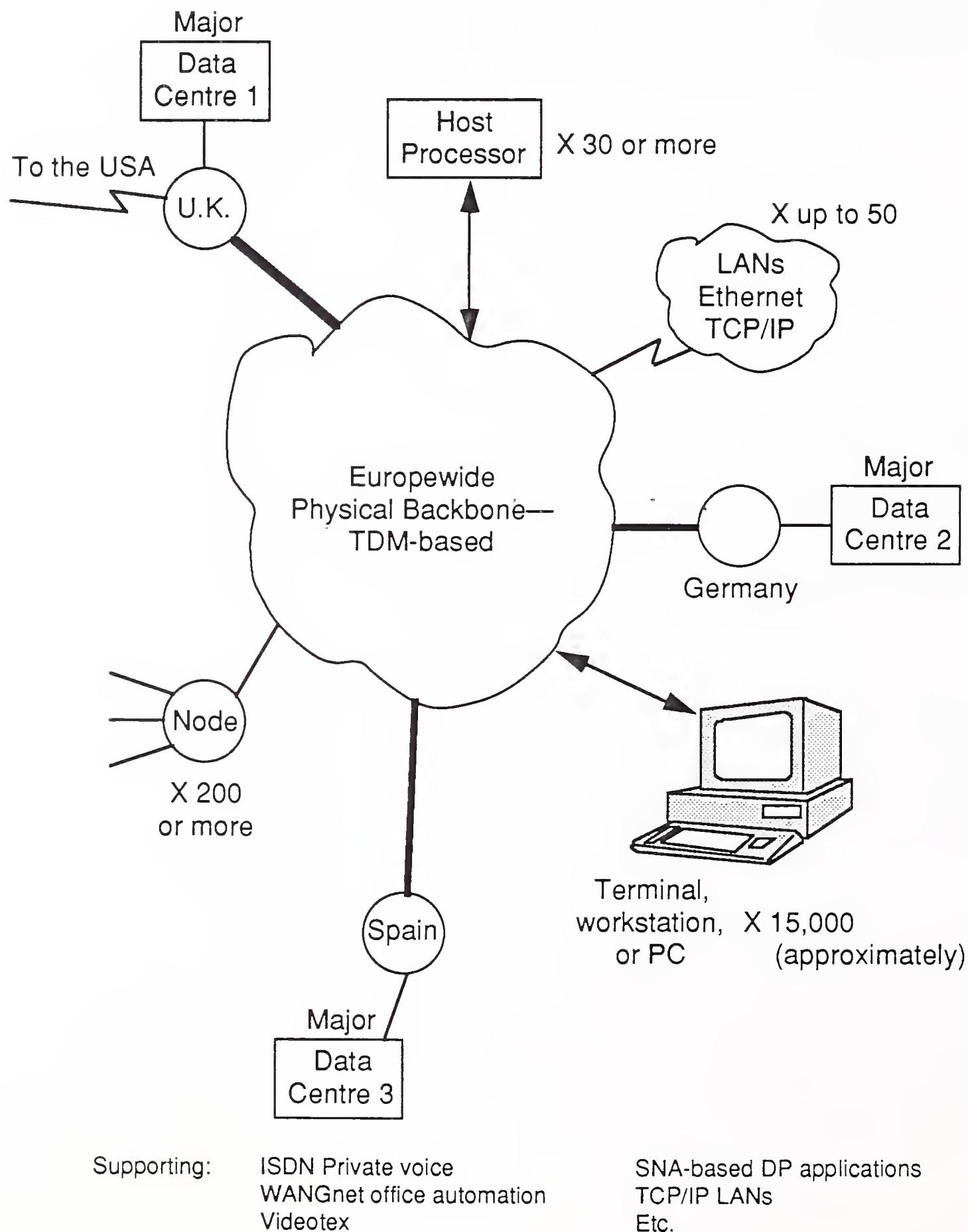
Exhibit III-5 summarises the backbone network structure in so far as is possible with the size of the Ford network, where there may be up to 15,000 users, excluding telephone handsets. Some of the other numbers associated with this vast operation are:

- The three major data centres act as the prime network control centres,
- Almost 40 data centres in various offices and plants are connected in,
- Over 200 nodal points associated with various centres are involved,
- There are at least 10 major network processors,
- Up to 50 LANs will eventually be connected.

In addition, a set of over 20 videoconferencing centres around Europe are linked and managed by British Telecom (BT) on an external supplier's management outsourcing contract.

EXHIBIT III-5

Network Diagram Ford in Europe



3. Interview Data

a. Responsibilities

The network management function includes responsibility for voice and for all types of non-voice telecommunications, i.e., data image, graphics, E-mail, telex, fax, videotex and videoconferencing, and this responsibility is Europe-wide.

The only area which is not covered is the local responsibility for managing LANs in their own domains. Interconnection of LANs comes under central control (i.e., our respondent). The subject of where responsibility should eventually lie is starting to become an issue because of the increasing number of LANs being installed and then interconnected. As little as three years ago there were only five LANs in Europe, but our current estimate is that there are over 30, the majority of which are interconnected.

The external contract to manage the videoconferencing network has been in place since 1983. In the context of putting management contracts out to external suppliers, our respondent made the robust comment that in many private networks of leased lines, 90% of the management tasks are undertaken anyway by the PTT and it is, therefore, in theory a very small step to go for the full outsourcing contract option.

b. Expenditures

Across Europe, Ford spends at least \$40 million per annum on telecommunications. This figure excludes equipment depreciation and staff costs. If allowance is made for these exclusions, and by reference to the numbers of in-house staff employed, INPUT estimates a figure nearer to \$60 million to be an all-in cost total. This total appears to be growing at an annual rate of 14%, as calculated by reference to the equivalent expenditure being incurred at the time of our previous interview with the Ford organisation.

The major cost items are:

- Circuit charges,
- Usage of PSTN and PDNs,
- Staff,
- Network hardware depreciation.

Only a small amount is spent with outside consultants for professional services.

c. In-house Functions

The organisation employs around 55 networking specialists in the central departments running the networks. This figure has grown by 10 in the last two and a half years. Another 60 odd staff are employed by the European operating companies to man the voice communications side as telephonists, telex operators, etc.

The networking team is divided into planning and operational staff. Planning staff, of whom there are some 20, are responsible for:

- Strategy studies,
- Detailed network design,
- Planning for installation, commissioning and test,
- Carrying out the implementation of new networks and major upgrades.

Operational staff (about 30) are involved with all the day-to-day tasks, including:

- Making minor network upgrades and reconfigurations,
- Fielding first-level end-user enquiries and problems,
- Arranging for diagnostics and first-level maintenance corrections,
- Network administration in terms of billing, inventory and other house-keeping-type chores.

A management team of five oversees the section, being responsible for technical quality and resource allocation. Staff are encouraged to cycle through the different subsections in order to gain all-around experience by spending some time on all the various tasks. The planning and longer term capacity management areas tend to be undertaken by the more senior team members. On day-to-day problem handling, Ford operates with a three-stage approach consisting of:

- Diagnostics—what's the problem?
- Fault management—how are we going to solve it?
- Service provision—solve it, keeping the end-user informed all the while.

Management tools are used to control various elements in the wide-area networking complex. These tools tend to be proprietary pieces of software that are only suitable for controlling one type of equipment, e.g:

- IBM's NETVIEW for the mainframe control functions or for the FEPs (front-end processors),
- Timeplex's NM System for the Timeplex multiplexers.

These 'element managers' need supervisory control on a hierarchical basis, and this should and will be introduced in some form of on-line hardware (e.g., a workstation) as and when the market comes up with something suitable.

Management of the installed base of LANs is really non-existent at the present moment since neither the problems nor their solutions are very clear. Current investigations are looking at what tools are available and which management structures would be most appropriate.

Satisfaction with network management tools rated slightly higher than satisfaction with vendors' performance. Sales people in the networking field need to know about the applications, and not merely their hardware platforms.

d. Outsourcing Benefits

The use of outsourcing in Ford had been confined hitherto to the taking of a videoconferencing management service from BT. Ford operates over 20 videoconferencing studios in important, strategic sites around Europe. The linking of these sites for a particular conference session involves high-speed lines leased by the various PTTs in Europe and by AT&T, for example, for linking up with U.S. studios. Ford takes a switching service from BT to perform this function.

The organisation's attitude to outsourcing generally is that the topic is kept under continuous review, particularly at times of recession. The flexibility involved in outsourcing is well understood. The ability to choose self-contained areas of work for outsourcing can depend upon finding various boundaries:

- Along organisational lines, e.g., in supporting one type of plant or one division with all its network management needs,
- Along functional lines, e.g., videoconferencing, dealer communications, private voice network, etc.,
- Or with a combination of organisational (vertical) and functional (horizontal) cuts through the problem.

Although at board level outsourcing is well known and used, in the networking field our respondent indicated two important inhibitors:

- Are there any credible (the word used was "real") offerings in the marketplace?
- How can vendors surmount this credibility hurdle in the perceptions of Ford's systems management?

An important criterion for any Ford network supplier, whether in the context of outsourced or in-house managed systems, is how international the offering is. All products and services have a better chance of success if they are at least pan-European in scope and are certainly supported throughout Europe. In spite of this, the PTTs, essentially national in scope and background, were given the highest rating of any vendor type in the assessment of their ability to fulfil network outsourcing requirements.

It was anticipated that in a year or two this could alter, with many vendors from different and even mixed backgrounds in contention with viable offerings. Nevertheless even if viable offerings appear in the market, an organisation like Ford, which has invested so much in private networking and has built up a sizeable team of specialists, will/would have great difficulty in migrating into a largely outsourced situation. By comparison, smaller concerns would find it that much easier.

In the U.S.A. Ford now outsources some of its IS elements, for example, high-speed printing. But these are the less mission-critical parts of the operations.

4. Key Aspects

The major concerns expressed are:

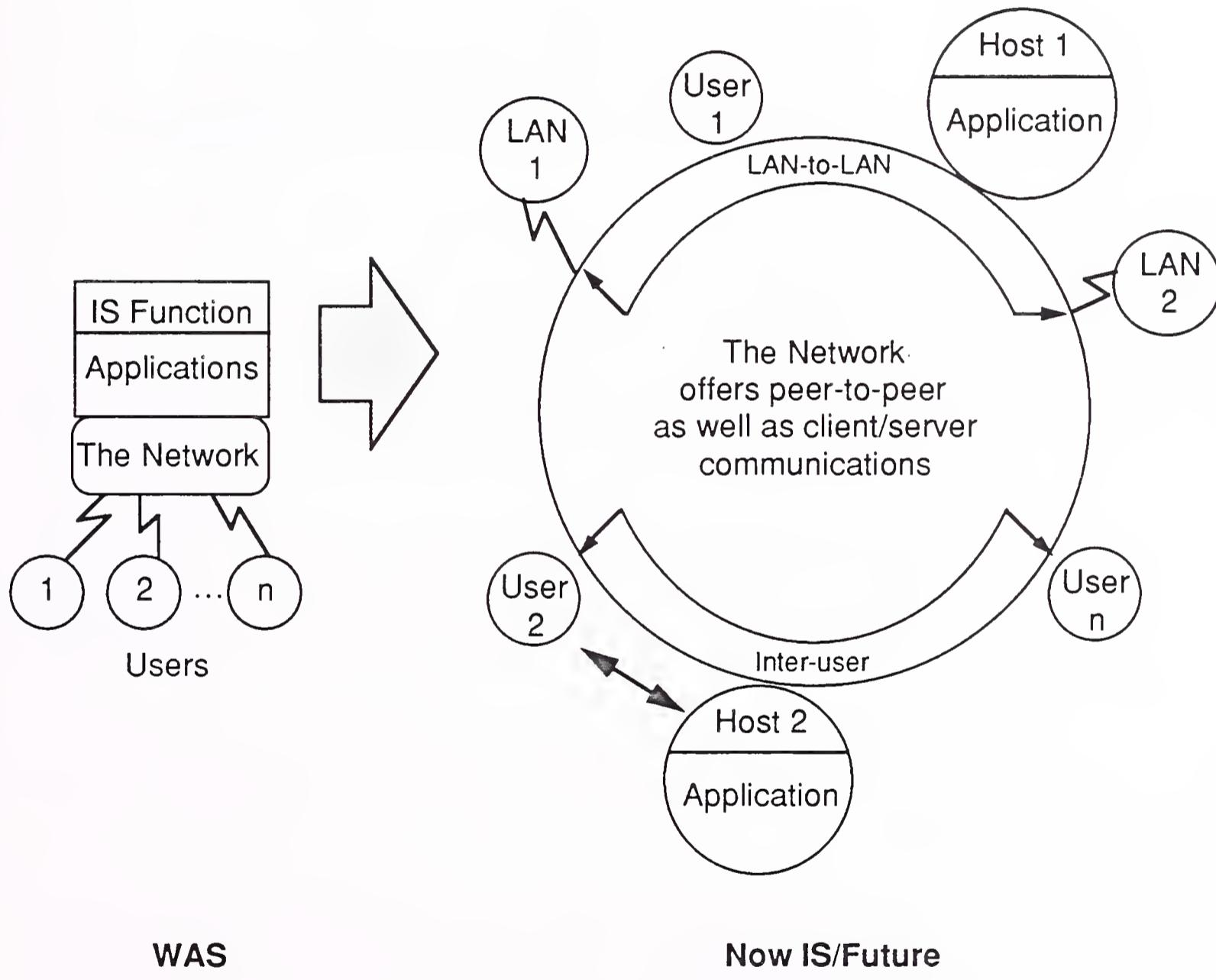
- Efficient use of the high bandwidths available. Ford has up to 12 megabits available between the U.K. and Germany and another four-plus megabits for transatlantic traffic. The company wants to see the most cost-effective use of this investment before moving on into the even higher bandwidth technologies that are coming on-stream, e.g., fast packet and frame relay. The group is looking for consolidation rather than costly innovation at this time.
- Our respondent has about 50 service-level contracts existing with the Ford operating companies and divisions to run the in-plant stock control systems. To be able to offer 99.5% uptime to his users, when he may be only able to obtain 98.5% from the carriers, means leasing back-up or duplicated lines for resilience. Service levels are, therefore, an increasing headache.
- Vendors must wake up and respond to these ongoing requirements if they want their services to be regarded as viable alternatives to in-house-managed services. To date this has not happened.

In summary, networking has matured considerably at Ford and also in the wider industry context, our respondent believes, and it is assuming a much more commanding role in the information systems (IS) function and within the business as a whole.

Whereas previously (and in many instances this is still the current state-of-the-art) the network was viewed merely as an enabling mechanism to allow specific applications to happen, (such as on-line transaction processing and enquiries), the network can now act as an entity in its own right, allowing interconnection of like devices (peer-to-peer), such as bridging or routing between LANs or electronic messaging between users. This expanded role for the network is illustrated in Exhibit III-6.

EXHIBIT III-6

Expanding Role of the Network



The organisational possibilities, as well as the functional potential, opened up by this new role have yet to be explored fully, or even at all, by management, let alone by top management. Current preoccupations are all at the technical level and, as such, are likely to predominate until the end of our forecast period.

Exhibit III-7 summarises the key aspects of the Ford situation in Europe.

EXHIBIT III-7

Key Aspects - Ford in Europe

- Bandwidth usage
- Service levels and resilience
- International/pan-European perspective
- Perception of vendor shortcomings
- Future potential for the role of networking

D

U.K. Central Government—Central Computer and Telecommunications Agency (CCTA)

1. Background

The Central Computer and Telecommunications Agency (CCTA) is an agency of central government in the U.K. Its function is mainly advisory in that it offers procurement and consultancy services on demand to the individual departments of government. It also has a role in establishing information systems standards for use in government IS projects.

Besides these roles, which are often linked to the computing part of its expertise, it also has a line role in operating and overseeing the central government's telecommunications facilities for voice and data. This set of functions comes under the section within CCTA known as CT4. The responsibilities of CCTA are illustrated in Exhibit III-8.

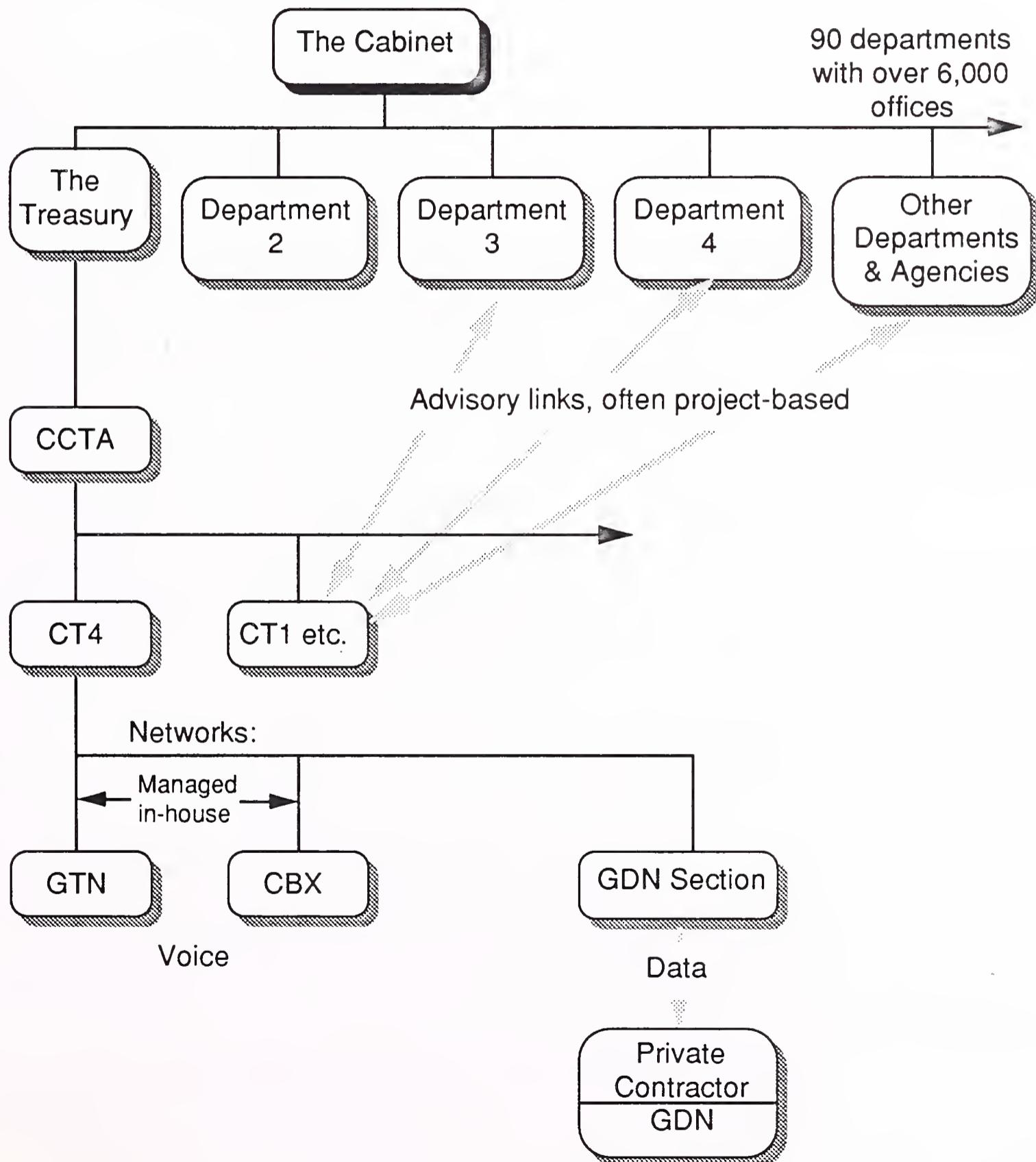
The agency employs several hundred staff to fulfil all its functions. Forty or more are employed directly in CT4 to run or oversee the operation of the central telecommunications networks, of which there are three:

- GTN, or Government Telecommunications Network, is the voice communications system, linking government offices up and down the country and with links to certain major embassies, for example, those in New York and in Brussels.
- CBX, or Central Branch Exchange, is the voice system that connects all government offices within a 1,000 yard radius of the exchange, located in Whitehall, London. Its function is to service the telephone handsets of some 30,000 "subscribers".

- GDN, or Government Data Network, is a data network which is contracted out under a long-term contract to a consortium headed by Racal Datacom, a subsidiary of the Racal Electronics Group. This is a data network offering a service to government departments, which are bound to consider it as one option in any new project involving networking.

EXHIBIT III-8

The CCTA—Its Roles and Linkages to Other Government Bodies



These are not by any means the only networks operated within U.K. Central Government. Three other categories should be considered:

- The international network run by the Foreign and Commonwealth office to link all embassies and high commissions to London, (as far as is possible given the patchy nature of communications around the globe). This network uses wired and wireless links.
- Wide-area data networks run by individual departments. These can either predate the establishment of the GDN or be run by the departments themselves to take account of the specialist nature of their requirements, e.g., secure Ministry of Defence networks.
- Local-area networks implemented throughout the individual departments and agencies. These are the responsibility of each department, which would normally be aware of any interoffice linkages required and would implement them with their own resources. Linkage of inter-departmental LANs is not a standard requirement.

The CCTA, therefore, is only responsible for the interdepartmental aspects of voice and data networks. All intradepartmental networking requirements reside with the individual departments, although the CCTA's advisory roles are available to be used under whatever guidelines are in force at the time.

2. Networking History

CBX is the longest established of the three central networks. It operates from a large tandem switch in Whitehall and connects to PABXs in major government buildings. It leases lines from the two public carriers (BT and Mercury Communications - MCL) and functions as a round-the-clock facility bringing advanced telephone features to 30,000 civil servants. CCTA's responsibilities include:

- Network design,
- Operational functions,
- Network maintenance.

The scope of this service includes maintenance and takes the responsibility right up to and including the handset. CBX is linked into the wider area GTN and could be said to be evolving in step with it, since it utilizes the same digital (Megastream) technologies as GTN. CBX can be thought of as an early example of a metropolitan-area network (MAN), as this is the scale of its geographic scope.

GTN has been developed in parallel with the GDN over the course of the last eight years. Although it has been in operation for a lot longer than the GDN, having evolved from an analogue network that goes back

several decades, its recent fortunes have been tied to the decision to establish a separate network for data to which the individual departments could subscribe. This decision stems from the period when fast digital transmission started to come available at the start of the 1980s. U.K. Central Government decided that it was more important to have the required data communications facilities available to departments, rather than risk the provision of the correct level of service by embarking on a substantial voice and data integration project at the same time.

GTN differs from the CBX in that CCTA's responsibilities as network operators only extend as far as the PABXs in the departmental buildings. From there on outwards, responsibility for availability and service, up to the handset, has to be taken up by each department.

GDN is an X.25 implementation owned and run by Racal Datacom on behalf of central government. Each department wishing to implement a new data networking project is obliged to cost and evaluate the option of using the GDN. The original decision to go for a separate network, instead of trying to evolve an integrated voice and data backbone based around the existing GTN, stemmed from the perceived lead-time involved in upgrading GTN to cope as well with the data load envisaged as it does with the high-priority voice requirements. At the time (the mid-1980s) four large departments had pressing needs and preferred to have a network specialized for data networking features. At the time of our research some 20 departments are using the network, which is growing in terms of access points. There are over 200 digital access points (DAPs) and, with a 10-year contract, of which over seven years are left to go, this number can be expected to rise considerably.

In recent months U.K. government policy has altered in favour of putting further development into the GTN as the framework for building the next generation of integrated digital network to support the future high-bandwidth applications, such as videoconferencing and Group 4 fax. Previously it had been planned to evolve the GDN into another generation of network, something which came to be known in the planning stage as the GTS (Government Telecommunications Service). GTS was to have had sufficient facilities to handle voice and data applications equally well. In January 1991, the government announced that it was breaking off negotiations with the GDN contractor because a satisfactory deal could not be struck. The principal reason for this breakdown was financial. The external contractor had to take into account the risk factor that some departments might not opt for its service but it would have to make the up-front investment to build the infrastructure to be able to support them should they opt to subscribe. This, coupled with the need to charge full commercial rates, caused the charges being considered to be too high when compared to doing the same thing in-house.

3. Technology

GTN is based on the DPNSS protocol, the U.K.'s de facto standard for private voice networks. In fact CCTA had considerable influence on the emergence of the standard since it pioneered its use in a multivendor situation. When the GTN was due for an upgrade with more powerful digital switches in the early 1980s, it was clear that the DPNSS standard, which had been developed by Plessey, was likely to diverge along a number of different paths, one version per supplier or per product group. For the new switches to be installed for the GTN, the CCTA specified that multivendor working was required for tender compliance. Three switch vendors were chosen who agreed to comply. These were Plessey, Mitel and GEC (which was at that stage separate from Plessey). Although heads were shaking in the industry that CCTA had embarked on a dangerous course, and although numbers of bugs had to be eradicated before the system was fully implemented, the project has been successful and, of course, other vendors have now brought their switches into compliance too—e.g., Ericsson, Ferranti, and British Rail Networks.

The evolution of this interworking capability and its embodiment in the internetworking standard, BTNR 189, has contributed to the success of the U.K. private network market. This market can now boast over 30,000 private networks, which is a greater number than in any other European country. DPNSS has also gone on to become a contender for the role of a pan-European standard for incorporation in private hybrid networks, although there are formidable problems both technical and political before that status is achieved.

The current position with the GTN is that it has grown to be the largest private network in the U.K. and now possesses the following characteristics:

- It has a fully digital backbone connecting 13 provincial switching centres in Great Britain with the London Control Centre.
- Over 200 x 2 Mbps (Megastream-capacity) digital lines leased from both the U.K.'s carriers, BT and Mercury Communications, are used to interconnect the switching centres with over 600 government offices throughout the country as well as the 250 switches/exchanges under the control of the CBX.
- In addition to the 2 Mbps high-capacity links, the network uses a mixture of analogue and digital (Kilostream - 64 Kbps - quality) lines to complete these interconnections.
- Overall 900 offices (these are the larger ones out of a total of over 6,000 offices) are linked, and voice communications are provided for 250,000 out of a total civil service staff complement of over 500,000.

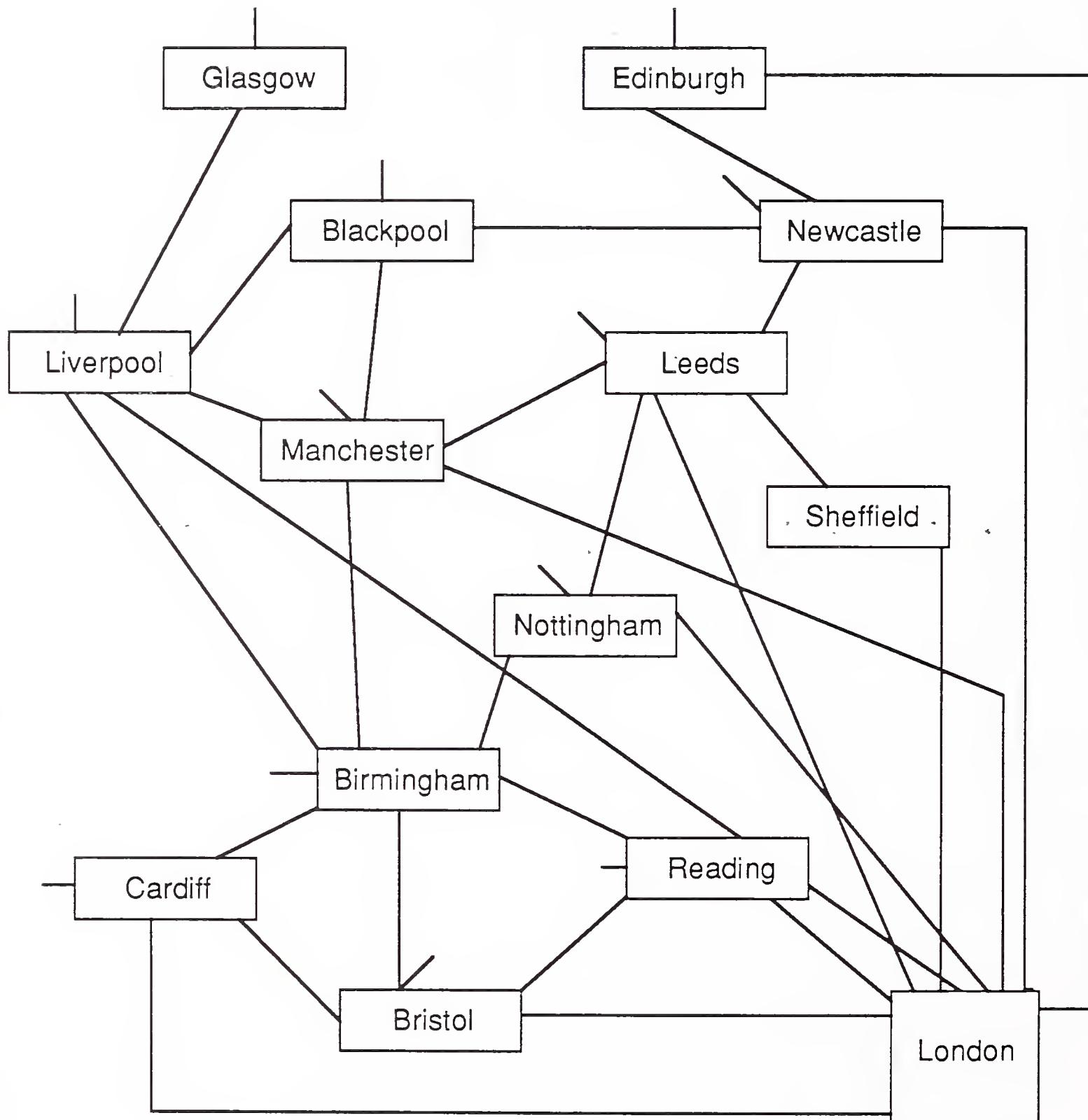
- Traffic volumes at the present time are rising by about 30% per annum taking all types of traffic into account. Even higher growth rates (up to 60%) are being recorded in the usage of certain types of traffic, notably using the network to "break-out" at local charge rates into the PSTN.

Exhibit III-9 sketches the backbone GTN including its link to CBX.

By contrast the GDN is an X.25 network with a digital backbone and a range of digital and analogue connections to individual departments. Its features were not researched in depth for this report.

EXHIBIT III-9

GTN Digital Network Backbone Structure



4. Interview Data

a. New Responsibilities

The short- to medium-term plans are to extend the capacity of the GTN so that it can start to support more non-voice applications. Currently less than 5% of traffic is non-voice, chiefly videoconferencing and some experimental work on automatic back-up to departmental Kilstream lines. It is anticipated that this proportion could rise to 15% by the turn of the century. Integration of fax, both Group 3 and Group 4, is another application that could possibly swell the non-voice component. The principal planned objectives are:

- To develop and operate a network that is capable of handling all types of information,
- To make available the amount of capacity required, i.e., to be able to match growing user demands.

Videoconferencing is seen as the main driving application in terms of bandwidth and capacity.

b. Expenditure

GTN and CBX operate as cost recovery centres, charging users on the basis of the amount of usage each makes of the network. CCTA pays for the salaries and overheads of the 40 or so staff running the network, and covers the annual running costs and depreciation factors associated with it. These include:

- Equipment depreciation and rental costs,
- Equipment maintenance,
- Line rentals,
- Call charges, incurred where GTN or CBX are directly accessing the public networks.

Since local PABXs are owned by individual departments, calls made from them to the public networks are incurred on departmental budgets, not on CCTAs.

The annual budget for the two voice networks, excluding salaries, is of the order of £25 million (U.S.\$48 million). This is growing at somewhere between 10% and 15% on an annual basis. The CCTA is reasonably happy that it is able to manage the 30% traffic volume increase already noted with this level of budget increase, bearing in mind that with the ability to break-out across the network (thereby giving departmental callers the benefit of local call rates), savings are being offered to other parts of the government machine.

c. In-house Functions

The CT4 section is split as follows:

- One section oversees the contract for the GDN.
- The Engineering Section looks after all the switches in GTN and CBX, and is responsible for maintenance and fault correction.
- Traffic Planning section examines the longer term capacity and design problems.
- Marketing and Administration handle the user interfaces for problem acknowledgement, requirement assessment, inventory control and billing.

The use of the digital trunk network is at the request of individual departments, with whom CT4 holds quarterly liaison meetings for the purpose of reviewing ongoing projects and future needs. CCTA will help in preparing cost/benefit analysis before any new type of usage is undertaken by a department, but all decisions to proceed or not are taken by the departments themselves.

A specialist network management tool has been provided by BT. It operates on a central control computer and can undertake a number of tasks:

- Network database maintenance
- Logging of traffic,
- Logging of faults and outages.

The customer's experience with it is mixed:

- Logging is done very effectively,
- Database changes have to use a rather cumbersome interface,
- There were considerable problems in the early days,
- BT has stopped selling the product and so ongoing developments have to be taken on a custom or semi-custom basis.

An overall assessment of the product included the comment that it appeared to suffer from the cultural split that exists in the industry between the voice and data camps. It is due for replacement in the next two to three years in parallel with the expected upgrade to the network, which will likely require a new type of switch in the major nodes.

d. Outsourcing Benefits and Major Concerns

The interview did not include any detail on the GDN data network, but it is hoped to update this profile during the course of the 1991 programme. However, we can list the main benefits that led the CCTA to contract externally for installation and operation of the GDN:

- A wish to shorten the lead-time for the provision of satisfactory data communications facilities to the charter subscribers,
- The decision was in line with general government policy at the time, which was against increasing headcounts,
- The most cost-effective solution was sought.

It is questionable whether the first of these benefits was obtained, since it took two years to come on-stream anyway.

In future it is anticipated that although overall control of the interdepartmental networks will remain in-house, major projects will be required that implement, and possibly also operate, new networks. Some of these projects might need to be contracted out, and that could include the project management of them.

The main concerns with the future of networks under the CCTA aegis can be summarized as follows:

- The principal aim is to plan within the next two to three years to implement a major upgrade to the infrastructure already described. There is this fairly short time-scale within which to plan, procure and implement, caused by the increased volume of traffic that is currently causing certain major switches to operate during peak periods at around 90% capacity.
- The required upgrade to the infrastructure should be designed to handle increasing traffic over a 5-10 year forward period. During this time, government departments are expected to continue dispersing away from central London, therefore increasing the probability of higher interdepartmental communications costs.
- Although CCTA has plenty of design elements in the course of preparation of at various stages of firmness, the major problem will be to draw it all together into a coherent plan. One important technology would be the VPN concept, which could be implemented as a means of effectively hiring part of the higher capacity needed. At present it is debarred from making use of VPN facilities because BT is not offering the facility on a fee per annum basis, and this prevents the cost/benefit analysis essential to government accounting from being undertaken.

5. Key Aspects

The networking requirements of the U.K. government are affected by the sheer size and diversity of the organization. This has had an influence on the ability of such a large body to embrace the concept of network integration across the different types of information—voice, data, text and image. The time is, however, now approaching when the next large-scale upgrade to the in-house backbone network must take this into account. The major challenge is to achieve much higher traffic capacity at an acceptable cost increase.

CCTA has now accumulated sufficient experience of the differing requirements for voice and data to be able to devise a successful integration strategy. Vendor support will nevertheless be required at many points in forthcoming projects over the next five years.

- Professional services to assist in strategic analysis, detailed design and project management,
- Network management services associated with upgrading of the network management toolset,
- Systems integration and network operations projects covering specific requirements, should this approach emerge at the strategy study level.

The most important factor to emerge from CCTA's recent experience of trying both approaches—outsourcing and in-house network—is the need to act as its own prime contractor in planning and implementing the next generation of networks.

Vendor activity in relation to very large users such as the U.K. government must be managed in relation to the customer being a major account:

- The key requirement in any account selling exercise is to be able to track the ongoing development of requirements.
- In this particular instance, deciding where the boundaries of major projects could be defined will also be key to being ready with suitable solutions, when opportunities arise.

Exhibit III-10 summarizes the key aspects of the U.K. Central Government Networks.

EXHIBIT III-10

Key Aspects—U.K. Central Government

- CCTA manages interdepartmental voice
- Departments manage intradepartmental voice
- Shared data network run under FM contract
 - Intradepartmental applications
 - Interdepartmental limited to messaging
 - Usage optional, consideration mandatory
- Integration under next generation of infrastructure
 - Starting in two years
 - Managed in-house
 - Multiple external contracts/needed to support

E

Wiggins Teape Group

1. Company Background

The Wiggins Teape Group (WTG) is part of the worldwide Wiggins Teape Appleton Company (WTA) formed in 1990 as a merger between the former Wiggins Teape and the Appleton corporation in the USA, both of which were subsidiaries of the B.A.T. Industries Group (BAT) and which were simultaneously demerged from BAT.

This demerger from the £21 billion (U.S.\$38 billion) BAT group was undertaken in order for that group to concentrate on its core activities of financial services and tobacco.

Wiggins Teape Appleton (WTA) is in the paper business, consisting of:

- Forestry and the manufacture of paper pulp.
- Manufacturing of fine business papers.
- Manufacturing of carbonless papers.
- Merchanting, or the wholesaling of its own and other manufacturers' papers, right across the range of paper products.

Since its formation WTA has entered into another merger, with the French paper company, A/J Marie (AJM). AJM's operations will eventually be integrated with those of WTG since it also trades mainly in European countries such as the UK and the Netherlands, besides its domestic base in France. WTG is active in the U.K., Belgium, Finland, France, Ireland, Italy, Netherlands and Germany, besides having forests in Brazil, Portugal and Spain. Appleton trades only in the North American markets, and for administrative and network infrastructure purposes must be considered for the foreseeable future as a separate operation.

In 1989 WTA (considered as an already formed group) had a turnover of approximately £1.6 billion (U.S.\$2.9 billion) and a trading profit of £200 million (U.S.\$360 million). The staff numbers employed were:

- Worldwide - 12,000
- Europe - 8,000
- U.K. - 5,000

As a result of the latest merger (with AJM) the equivalent revenues for 1989 have grown to £2.5 billion (U.S.\$4.5 billion) over 70% of which was obtained in Europe. The staff employed in Europe has also risen to some 15,000, or 80% of the WTA complement.

The head of Information Services for the group has line responsibility for the central data centre serving all divisions, as well as for the divisional equipment and the applications teams in the divisions. The divisions and individual businesses have their own budgets. The central data centre in Basingstoke, U.K. has around 60 DP Staff.

Each division has its own information systems applications and besides a large mainframe in the central data centre at Basingstoke where the group IS department is also situated, there are VAX machines in the factories, and midrange or small 4300 mainframes in different overseas subsidiaries. There are IBM AS/400s in the French and Belgian merchanting.

The group will continue to run in two main geographic segments:

- Wiggins Teape Group Limited (WTG) will continue to run the U.K. and European operations covering four main divisions, and will be increasingly rationalised with the AJM activities:
 - Pulp making.
 - Fine papers.
 - Carbonless papers.
 - Merchanting.
- Appleton will continue to manufacture and market in the U.S. for its own brand of carbonless paper as well as marketing for the complete catalogue of Wiggins Teape products in the Americas. Its information systems were outside the scope of this interview.

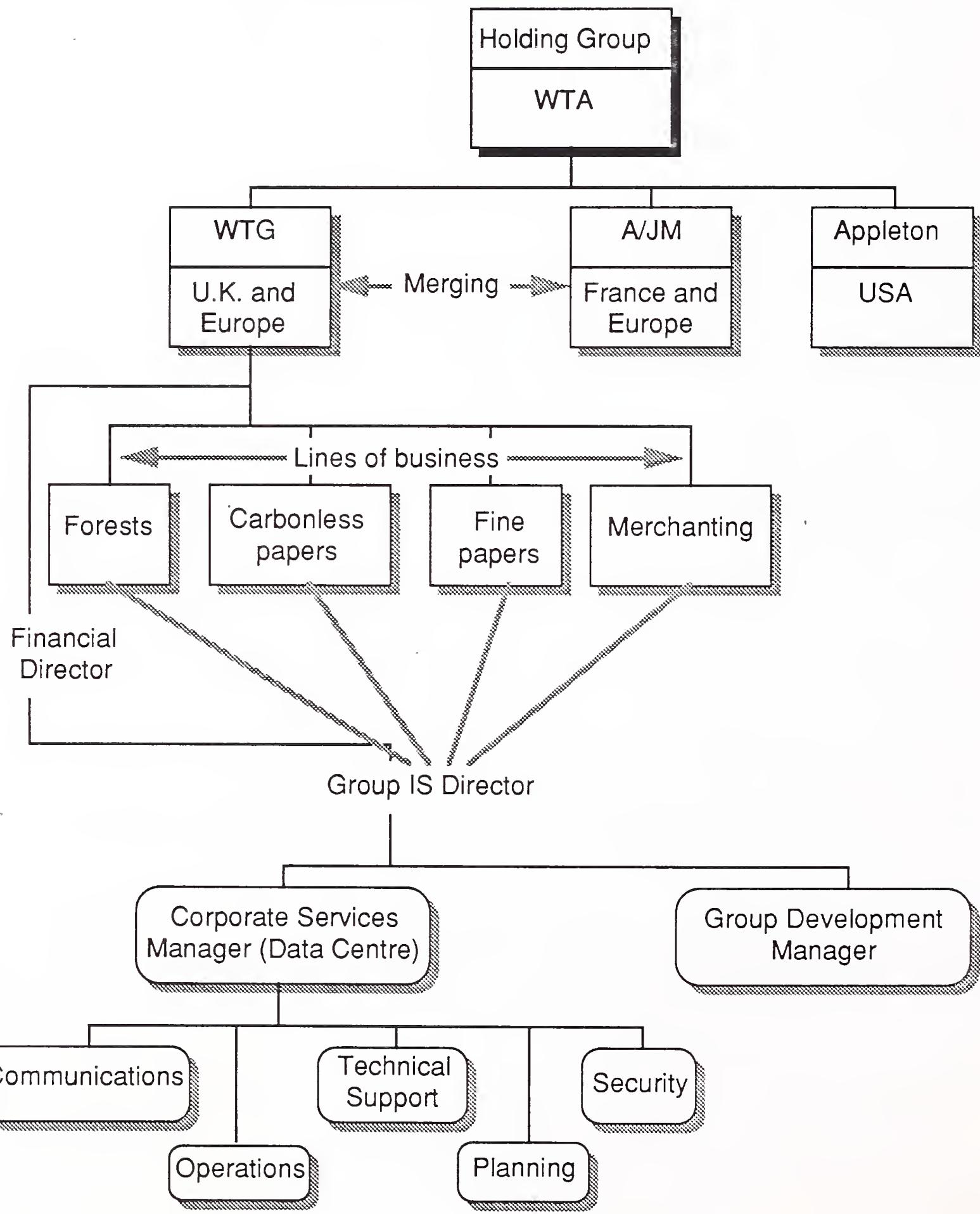
The structure of the information systems department for WTG is three tier:

- The corporate management is responsible for setting and implementing the strategy.
- The individual divisions and businesses have their own applications and form a series of functional reporting units. As managers they report to their business CEOs and on a dotted line basis to the head of Information Services.
- Headquarters has its own applications and acts as a separate unit on this level.
- Serving all the units as required is the central data centre which is restricted to supporting operations in the U.K.

Exhibit III-11 illustrates the divisional organisation, as well as the reporting structure and departments involved in information systems and services. The Communications department was the subject of INPUT's latest research. Its manager reports to the data centre manager and its activities are supplemented by resources in the Operations and Technical Support departments.

EXHIBIT III-11

Organisation Chart Wiggins Teape Group



2. Networking

WTG has a considerable amount of experience in running an integrated network, with responsibility for all types of communications equipment and operations coming under one head—voice, data, telex, fax and graphics. Exhibit III-12 shows the extent of the digital backbone network linking 15 nodal points with Megastream (2 Mbps), Kilstream (64 Kbps) services and analogue (9.6 Kbps) circuits. The technology is TDM, based on Timeplex multiplexers—Link1s in the major nodes and MicroLink1s in the minor nodes.

The only overseas node connected currently to the backbone is situated in the merchanting operation in Belgium, which is located at Nivelles outside Brussels. Other international communications traffic, both internal and external to the group, is handled mainly on the GEIS worldwide network, which can accommodate both SNA and X.25 connection.

The network is controlled from the data centre at Basingstoke and supports over 1,000 terminal and PC users as well as the voice PABXs. Protocols used are SNA and DECnet.

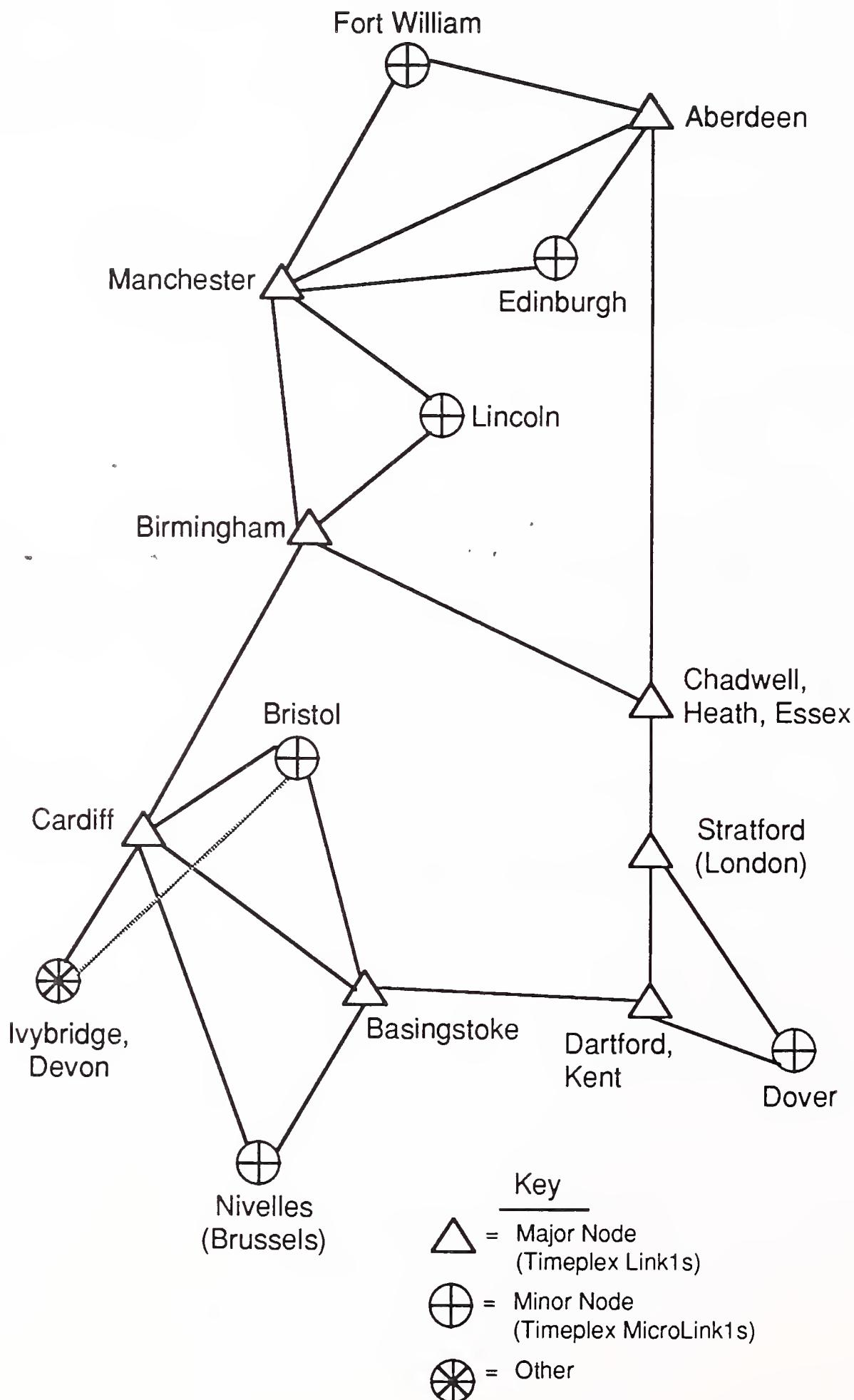
Local-area networks (LANs) are dealt with on local budgets. There are at least 12 currently installed, operating through a variety of standards and software—Ethernet, IBM, Token Ring and Novell are all present. The Communications department is active in looking for consultancy work to advise on the implementation of LANs throughout the group, but there is as yet no group policy for interconnection.

Future directions for networking include extending the network into Europe and connecting to both the WTG and the AJM sites.

The Appleton to WTG traffic will continue to be handled by the GEIS network, for the medium-term at least.

EXHIBIT III-12

Backbone Network Wiggins Teape Group



3. Interview Data

a. Responsibilities

Our respondent is responsible for planning and operating the group network to an agreed budget, i.e., the network is a break-even cost centre. All wide-area networking is covered by the remit; local-area networking is only covered in so far as it uses the group wide-area network to interconnect across LANs in individual sites.

There is no use made of external contractors for network FM. External service contractors feature only for:

- International traffic, with GEIS.
- Network maintenance, with ServiceTec for terminals and network controllers.

b. Expenditure

WTG has imposed severe budget constraints in order to bring the overall expenditure on IS (information services) down to a lower level, one more in accordance with the Board's idea of what it should be for a group of its size. Communications is playing its part in achieving this.

The 1989 expenditure on telecommunications was £2.0 million (U.S.\$3.6 million). This included:

- Line and circuit rentals.
- Network equipment such as controllers and multiplexers, and its maintenance.
- Software.
- Employee costs.
- Miscellaneous, including the GEIS account, EDI, E-mail and some specialised consultancy.

PSTN charges are borne by the local divisional and departmental budgets.

In 1990, expenditure against a similar budget of £2.0 million was down 23% to £1.6 million (U.S.\$2.9 million), and is expected to be reduced again in 1991 by another 11%. This policy of maintaining or reducing expenditure levels is expected to continue. One particular plank in the strategy is to lower the expected life-time of equipment, re-equip with a later generation of equipment which boasts a greater reliability and at the same time require a lower maintenance fee.

INPUT has reservations about the long-term efficacy of this policy but notes that its replication throughout the industry is consistent with the trend of falling hardware and maintenance revenues.

c. In-house Functions

Management of the WTG network is split between the Communications and Operations departments (see Exhibit III-11):

- Day-to-day operations, including first-line help desk query handling, configuration management and administration, are done by the operations side.
- Network design, capacity management, implementation, consultancy, strategic planning and marketing (i.e., identifying new internal opportunities for improved communications) are all performed by the Communications department consisting of the manager and three specialists.

LAN management is a local issue, a group policy for which is still to be formed. WAN bandwidth management and its cost implications are the highest priority issues at present.

d. Tools

A number of network management tools are in use:

- Link NM from Timeplex monitors the TDMs and network controllers, providing alerts, first-line dynamic reconfiguration, and some bandwidth management functions.
- Network PC looks after the mainframe network functions and provides an interface to the non-SNA activity.
- DECnet monitors its own functionality from within its suite.
- Off-line tools used include:
 - Lotus 1-2-3 for administration and inventory
 - Hoskyns' PMW for project implementation
 - IBM's Infoman for problem management and helping to run the help desk.

In common with other respondents WTG is looking to evolve from these standalone proprietary network management tools in use today towards an integrated set implementing an open network solution. The expectation is that a seamless, comprehensive toolset will take 10 years to provide. It will allow for much closer, proactive control of the network as an instrument for business management.

e. Outsourcing Benefits

Recent evaluations of the outsourcing options for network management have looked at both the BT PSS system and different managed network services (MNS) offerings. It has been independently assessed that cost overall could rise by between 15% and 20%, if this type of option was chosen.

At present, WTG operates its network with a minimum of staff for its size. To move to an outsourced solution would inevitably involve more persons getting involved. Certainly to improve the network availability above its current 99% plus levels would cause considerable extra cabling cost.

Our respondent was not aware of any trend towards outsourcing in his industry.

However, the European operations could well go down the outsourcing route, should speedy merging with the AJM network be required. An outside contractor would have more experience of the varied PTT environments likely to be encountered.

f. Major Concerns and Issues

The top three concerns in this group were:

- The need to co-ordinate across multiple PTTs in the emerging European single market as the WTG and AJM operations merge. This really called for a one-stop shopping service.
- Concern over supplier reliability. Past experience in a multivendor network environment has involved faults in servicing at the nuts and bolts level. Good contracts negotiated at senior level could be jeopardised by silly, human errors at the maintenance engineer level. This appears to call for better training methods and a higher quality of staff supervision.
- Costs were an on-going concern but were being contained by the strategies already outlined.

4. Key Aspects

This user exhibits the characteristics of a mature networking enterprise. In common with its DP experience, it also exhibits a solid background in the technologies of voice and data, and in their integration.

The company has for several years been run as a leading industry player within a much larger group, in fact one of the U.K.'s top five conglomerate companies. Now as a demerged operation it is free to pursue its chosen sectors, and has started to grasp the meaning of this freedom in an increasingly global marketplace. Merging with the French group, AJM, poses organisational challenges that will impact on the networking requirements and the solutions brought to bear on them.

The communications function is a small unit within a highly distributed computing environment which is moving steadily from mainframe to midrange systems usage. Networking costs appear to be well under control in a situation of expanding traffic volumes. An entrepreneurial spirit is at work within this department, finding opportunities for improving information flows and efficiency and reducing overall costs. Plans to make use of newer technologies, such as linking of mobile communications into the backbone network, implementing international links and using better compression techniques, are likely to mature into actual projects.

The greatest unknown in the current management thinking revolves around the diversity of networking environments to be encountered across Western Europe, as operations start to be drawn into an integrated whole at a continental level. The "mosaic" of European PTT environments, as INPUT has already dubbed this problem during our current analysis, remains the greatest obstacle to the proactive use of networking in European companies.

Exhibit III-13 lists the summary of key points.

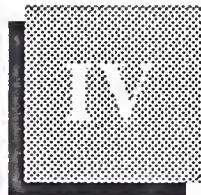
EXHIBIT III-13

Key Aspects - Wiggins Teape Group

- Solid integration experience
- National network evolving into a European one
- Entrepreneurial central group
- Full use of future technologies, e.g., mobile



Managing User Networks



Managing User Networks

A

Network Management Described

To understand the growing importance of networks, several factors must be taken into account, since they have a direct bearing on the size of the market for network management services and the approach to be taken to penetrate the market.

The first factor is the definition of a telecommunications network. INPUT defines a network as:

Electronic interconnections between sites or locations that may incorporate links between central computer sites and remote locations and switching and/or regional data processing nodes.

When considering the definition, there are several things to keep in mind.

- The definition encompasses data, voice, video, and textual information.
- The definition excludes applications software systems.

With the definition in mind, vendors of network management services must be aware that a network is viewed differently by end users, by information systems and network managers, and by vendors of network-related equipment or services.

Awareness of these differences is necessary, since the end user's view of a network has a direct bearing on the degree of difficulty in marketing network management services.

1. User Perspective of Networks

Both general industry and INPUT research concludes that end users (salespeople, accountants, executives, etc.) generally view a network as the method by which a fax or a message is sent or received or a telephone call is made.

Beyond the somewhat vague reference to the presence of a network, they have little knowledge of how systems connect or how data is transmitted.

In general, a network is viewed by end users much like a cloud might be viewed. They know that it is there, but have little knowledge of its composition or the complexities of creating one.

Just as people expect days to be sunny, they expect lights to turn on with the change of a switch and networks to transmit data fast and reliably. They certainly have little, if any, interest in or knowledge of what is required to manage a network.

The user's perspective of a network is important to both information systems managers and vendors.

- To the information systems manager, the user's perspective means that increased education and greater effort is needed to instill an understanding of the value of effective network management.
- To the vendor, the user perspective is also important. Since the end user is increasingly the customer, the user must readily understand the value of effective management.

2. Information Systems Management's Perspective of Networks

Information systems management's perspective of a network is also important, since management must be able to understand the need for a variety of skills to address the rapid changes in technology.

From an information systems or telecommunications manager's viewpoint, a network is more a collection of discrete parts that must fit together into a single delivery highway. They frequently have little understanding of a user department's needs or concerns.

Since the network management process can be time-consuming and costly, particularly in the light of rapidly changing technology, managers must continually weigh the benefits of in-house management with the advantages of a comprehensive management service.

Compounding the difficulty of managing increasingly complex networks and recognizing that users are increasingly in charge of expenditures,

information systems and telecommunications managers must be able to convey management needs and outsourcing options in terms that users can understand.

3. Vendor Perspective of Networks

A vendor's perspective is generally orientated to a specific product or service. Vendors of large PBXs or intelligent multiplexers provide a high degree of product expertise.

However, in the opinion of users, though many products are good and will meet specific needs, vendors do not have sufficiently broad technical or management skills to meet the needs of managing a complex network.

4. Describing Network Management

Network management is a complex set of interrelated tasks, a primary purpose of which is to balance a wide variety of technological solutions in a continually changing environment.

Primary network management functions, listed in Exhibit IV-1 and discussed further in this section, have the following characteristics:

- Network design is a continual process of trying to balance the benefits of new technology with the requirements of constantly changing organizations.
- Configuration management is a process of trying to ensure the maximum utilization of available equipment and services.
- Problem management is a process of continually reacting to end-user problems, to failures and capacity overloads.
- Capacity management is the ongoing process of ensuring that the network is able to handle end-user needs despite the fact that they are generally not well-known nor forecast.
- Network administration handles the end-user billing very much as a utility bills its customers. Bills have to be accurate and any errors must be corrected. Administration also includes:
 - Handling orders for new service or changes to existing services.
 - Managing the network equipment inventory.

For the purposes of this report, management reporting is considered part of administration. In some larger organizations, this may be a separate task.

EXHIBIT IV-1

Network Management Is Complex

- Network design
- Configuration management
- Problem management
- Capacity management
- Network administration

B**Network Management Functions**

Network management covers a wide range of activities. Although these activities can be described as being in several neatly separated categories, they are, in fact, a closely interwoven set of daily activities.

The following provides a description of major activities included in each of the functions.

1. Network Design

Numerous activities are included as part of network design. Performed inadequately, they can have a significant effect on an organization's strategic position and operational ability.

a. Strategic Planning

In telecommunications, as in other parts of organizations, strategic planning has until recently been given verbal support, but frequently little else. This has begun to change.

Until recently, only a small percentage of information systems organizations included strategic telecommunications planning as part of their plans. Two years ago, users indicated that only 60% of information systems plans included telecommunications. Today, that number has grown to 90%.

An increasing number of organizations have developed strategic telecommunications plans, but the plans are frequently less than comprehensive. The plans are often narrow in focus and orientated to the application of current technology.

In addition, few telecommunications plans are followed. Operational necessity frequently requires focus on daily activities and crisis management rather than strategic planning.

Today, telecommunications is increasingly accepted as a strategic asset and there is increased emphasis on ensuring that integrated networks are in place to meet future needs.

b. Network Design

Network design is an increasingly critical activity for several reasons.

Users are placing increased emphasis on the application of new technology that can improve cost-effectiveness. The ability to use wideband circuits multi-functionally can provide significant economic advantages.

There is an increasing need to integrate LANs into the corporate network. Developed as standalone islands, LANs are becoming a corporate asset and need to be managed like other assets.

Users are devoting more time to planning for the use of public services that will enhance the value of their networks. Services such as EDI and electronic mail are receiving increased attention.

In addition to the development activities, there are continuing needs to assess least-cost routing alternatives for leased circuits. With the increase in competition for national and international services, additional emphasis is being placed by a number of organizations on assessing alternative services and design.

c. Network Optimisation

As networks grow and improved technologies become available, opportunities arise to improve the performance of the network. Most users interviewed are in a continuous process of network optimisation planning.

The frequent changes in price and structure of existing services and the introduction of new products and services require frequent examination of the network to optimize costs and service performance.

d. Disaster Planning

Few organizations have a formalized disaster plan. Typically, they have plans for management of component failure situations, but few plans address major failures, particularly the failure of a communications centre in a major plant or office.

2. Configuration Management

Configuration management includes two separate but related activities.

- Static configuration management is maintenance of a network as it exists at a given time, usually at the time it is set up. This is frequently used as a basis for inventory management, but can become quickly outdated.
- Dynamic configuration management is the actual configuration at any given time. It reflects changes that have been made to accommodate line and equipment outages and plans for pending changes.

Frequently viewed as a less important activity, proper management of an organization's configuration can result in significant savings.

As the process of network integration grows in importance, configuration management must also become more important. As an increasing number of workstation and PC users demand access to corporate systems, network managers must have knowledge of the demands that can be made at any given time.

3. Problem Management

Problem management is the most common function of network management, and continues to require the largest portion of network management expenditures. But it is only one of many tasks.

Although users expect that new diagnostic tools, digital networks, and improved management procedures will help contain costs, the integration of complex networks may make problem management increasingly difficult in the future.

In a network, identification of a problem can be difficult and time-consuming. Integration will make this problem more difficult.

- Isolating a faulty piece of equipment at the distant end of a network will require sophisticated tools that are only now becoming available. The complexity of the task is greater when device types are mixed on a network.
- In an integrated network, differing areas of expertise are needed to assist in problem identification and resolution. The skills necessary to identify, for example, voice system and LAN network problems are frequently different.

4. Capacity Management

As networks grow in both size and numbers of applications supported, the process of managing capacity becomes increasingly complex. The process will become more complex in the future, as organizations focus on integrated network services.

Forecasting capacity has always been difficult. Information staff forecast in technical terms (numbers of transactions), and users forecast in volume of business (e.g., numbers of purchase orders). Traditionally, reconciling the two in terms of network capacity requirements has been less than satisfactory.

As network elements become integrated, forecasting will become increasingly difficult. The capacity forecasting measurements of voice and data have always been different, making integration difficult. The addition of interconnected LANs to an integrated network will make the process of forecasting capacity requirements even more difficult.

5. Network Administration

The process of network administration is similar to that used by the PTTs and common carriers. Activities include maintaining a directory, handling orders for new equipment, and maintaining a catalogue of equipment allowed on the network.

Network administration is highly customer oriented, labour intensive, and time consuming. Although the integrated networks of the future may reduce some of the day-to-day problems of the past, they will increase the complexity and costs of network administration in some organizations.

C

Organisation of Network Management

1. Management Responsibility Changing

Until recently, data and voice networks were managed by different organizations for reasons that have both historical and technological precedent.

Voice communications have traditionally been part of a corporate administrative or other (operating) department function. Voice communications management was well-established before data communications began receiving management interest.

In addition to the historical precedent, design specifications for voice and data communications are different.

Voice communications can generally be of somewhat lower quality than data communications, since the human being has a greater ability to make

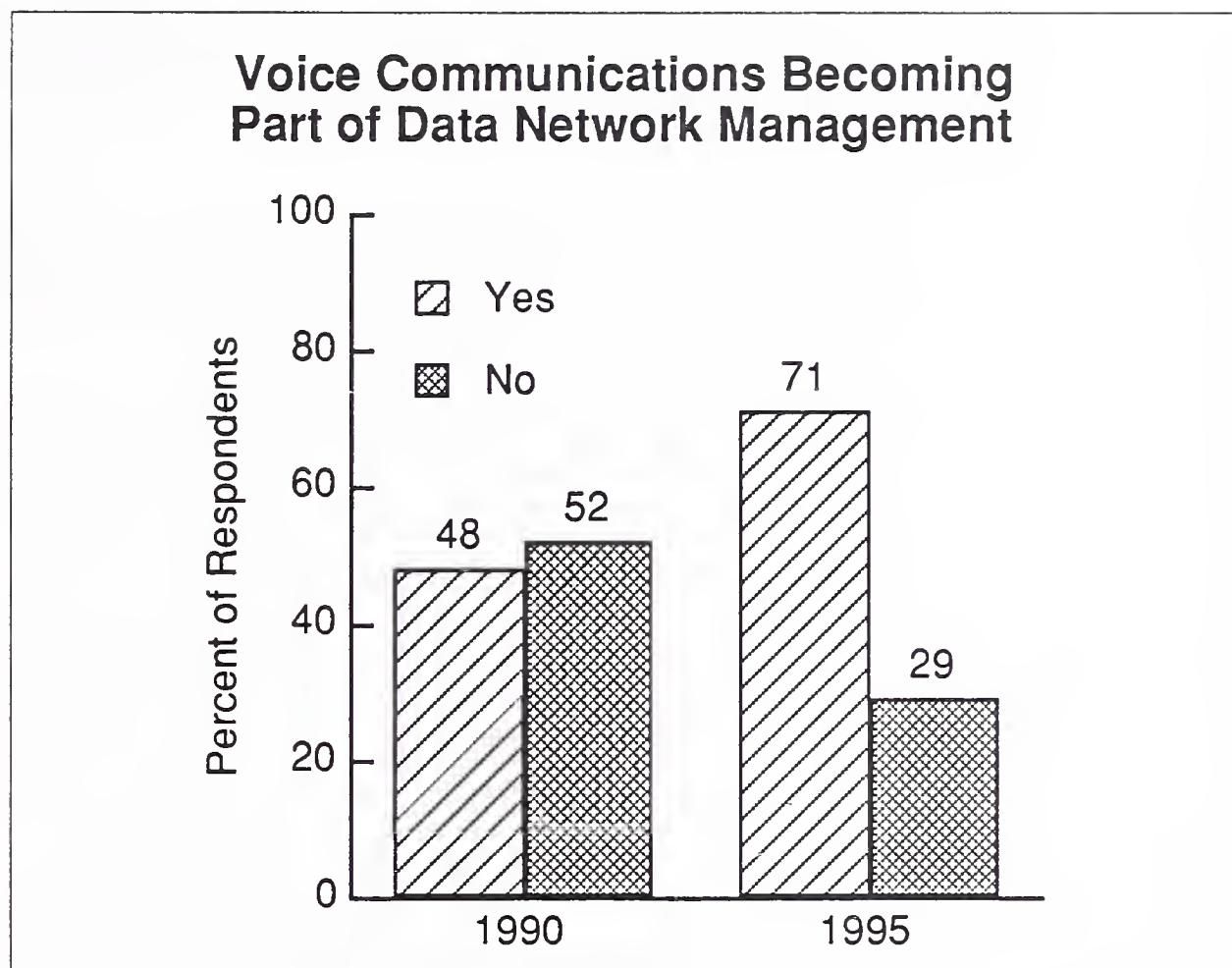
adjustments to factors such as line noise and line feedback. Data communications must consider factors such as peak hour line loading, and voice communications must consider factors such as call holding time.

Until recently, voice and data communications were viewed as sufficiently different that they needed to be managed by separate groups. However, this situation has been changing and will continue to change.

As indicated in Exhibit IV-2, responsibility for voice communications is fairly evenly split between information systems (data network management) and other areas of the organization.

- Research indicates that nearly 50% of information systems organizations now have responsibility for voice communications management. Only a few years ago, this figure was around 25% to 30%.
- As Exhibit IV-2 also indicates, users expect that the percentage of information systems organizations that will have responsibility for voice communications will increase to approximately 70% within the next five years. There are several reasons for this shift:
 - One reason is that, in many organizations, administrative or operating groups are more oriented to other aspects of the business and are not able to devote the time or technological expertise to this increasingly important business service.
 - Another reason is the growing emphasis on the integration of network-based services. As network services become more integrated, it is necessary to have an integrated management process.
 - The scarce resource represented by networking specialists will have to be shared from under one management function.

EXHIBIT IV-2

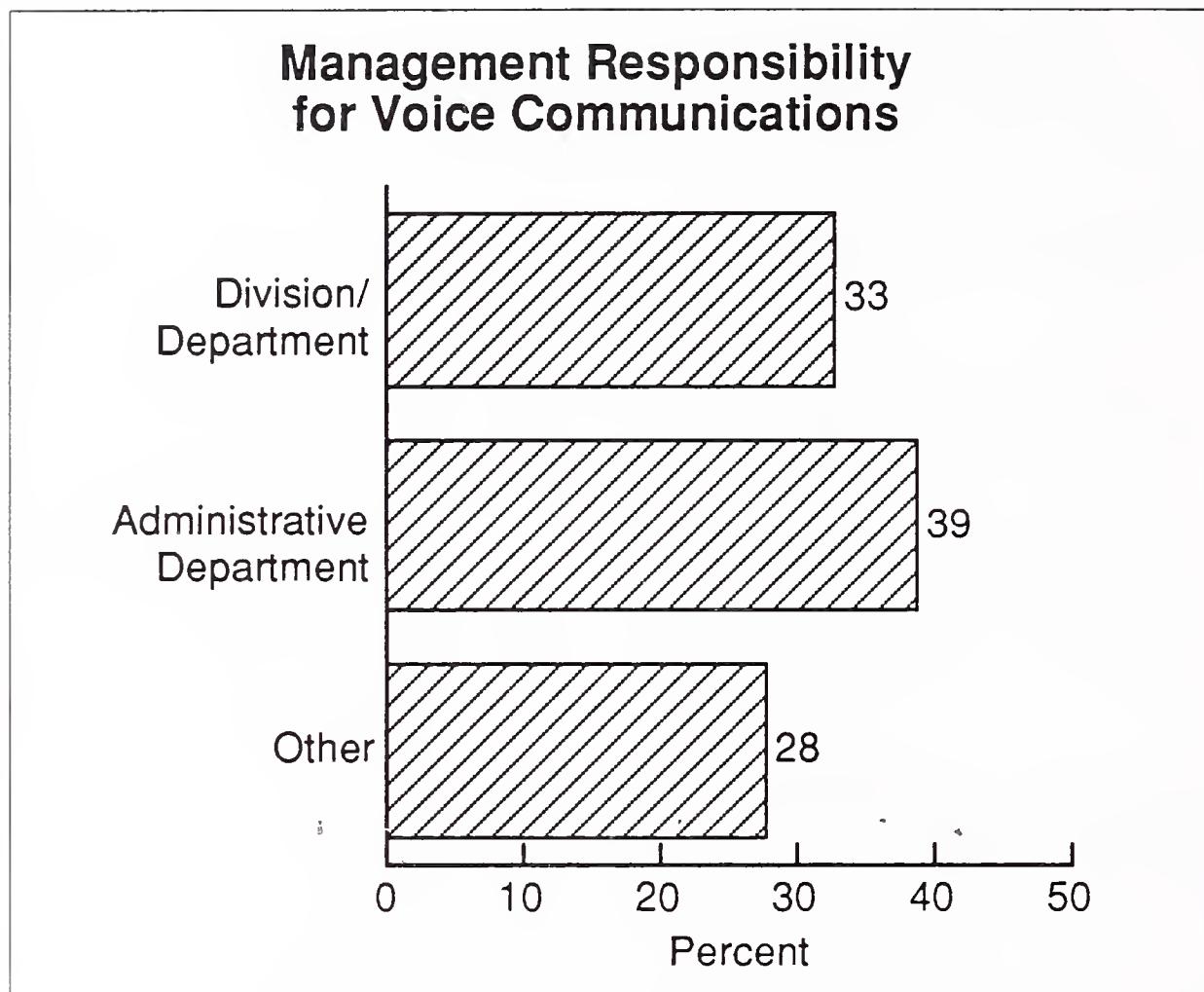


Today, voice communications that are not part of information systems are managed by a variety of groups. As indicated in Exhibit IV-3, a third are managed by an operating division or department. Nearly 40% are managed by an administrative department, and slightly less than 30% are managed by some other group.

- The other category noted by nearly 30% of the respondents is managed by a separate organization set up specifically to manage voice communications. This practice is not uncommon in large organizations where there is an exceptionally large voice communications requirement.
- Migration of the other category to information systems responsibility is not a difficult transition. The organization and expertise exists and reporting responsibilities can be changed as necessary in response to growing needs.
- Migration of responsibilities that currently fall between divisions/departments could prove to be more difficult. Divisions have frequently taken on responsibility because of their size and because the corporate information systems group has not demonstrated responsiveness to the users' needs and requirements.
- Migration of administrative department responsibilities is a logical transition. Many administrative managers will be more than happy to give up responsibility for voice communications. Those who do not

want to relinquish control will find management in an integrated network environment increasingly difficult and will, of necessity, give up control.

EXHIBIT IV-3

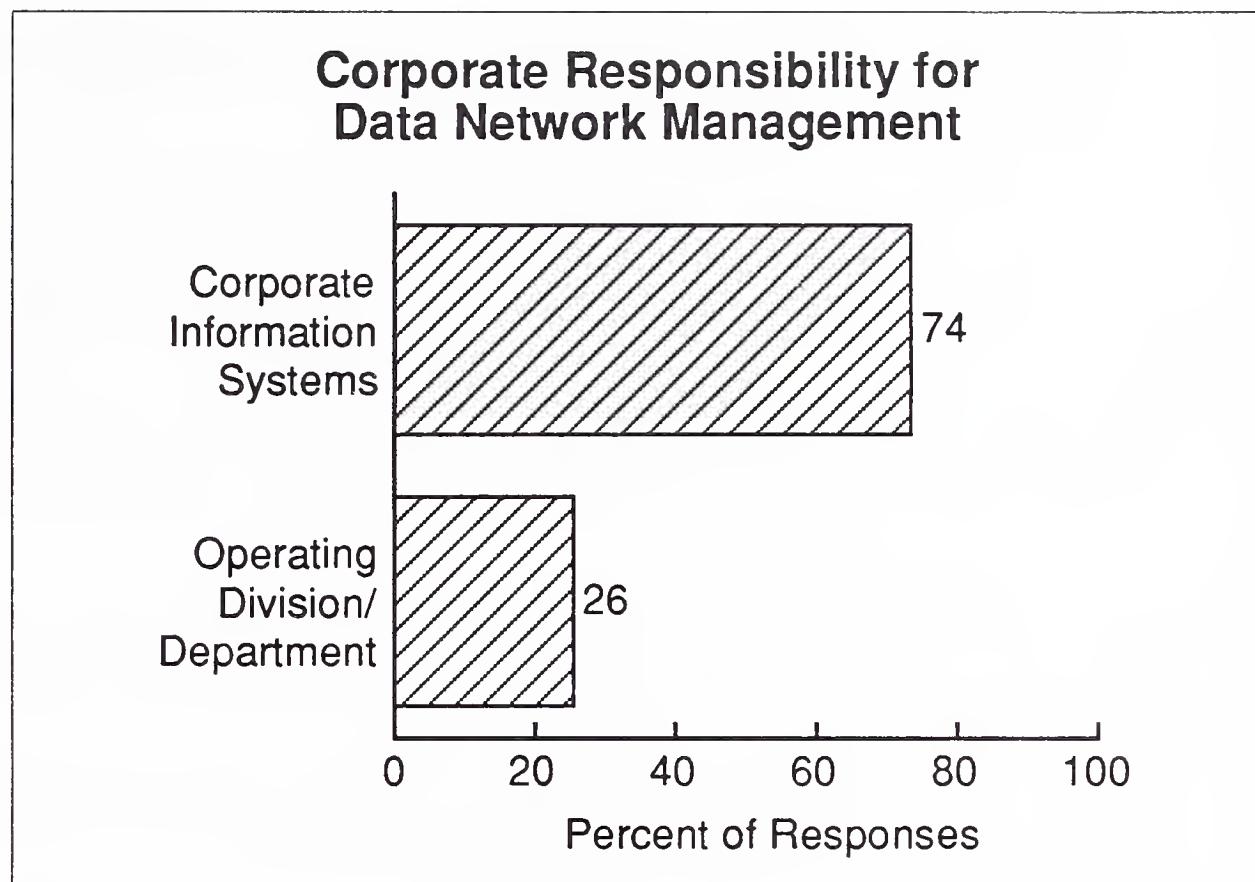


Whether the transition is easy or difficult, information systems will be increasingly responsible for both voice and data communications. As indicated in Exhibit IV-4, data networks are managed predominantly by a corporate information systems group.

Although an assessment of trends in responsibility for information systems is beyond the scope of this report, industry research suggests that at least some level of application responsibility will remain with a user's department or division.

However, INPUT believes that this will not be the case with an organization's networks. Though an application may only have a single user, a network must increasingly be able to serve multiple users. As a result, while some local voice requirements may continue to be met by division management, the majority will shift to corporate management.

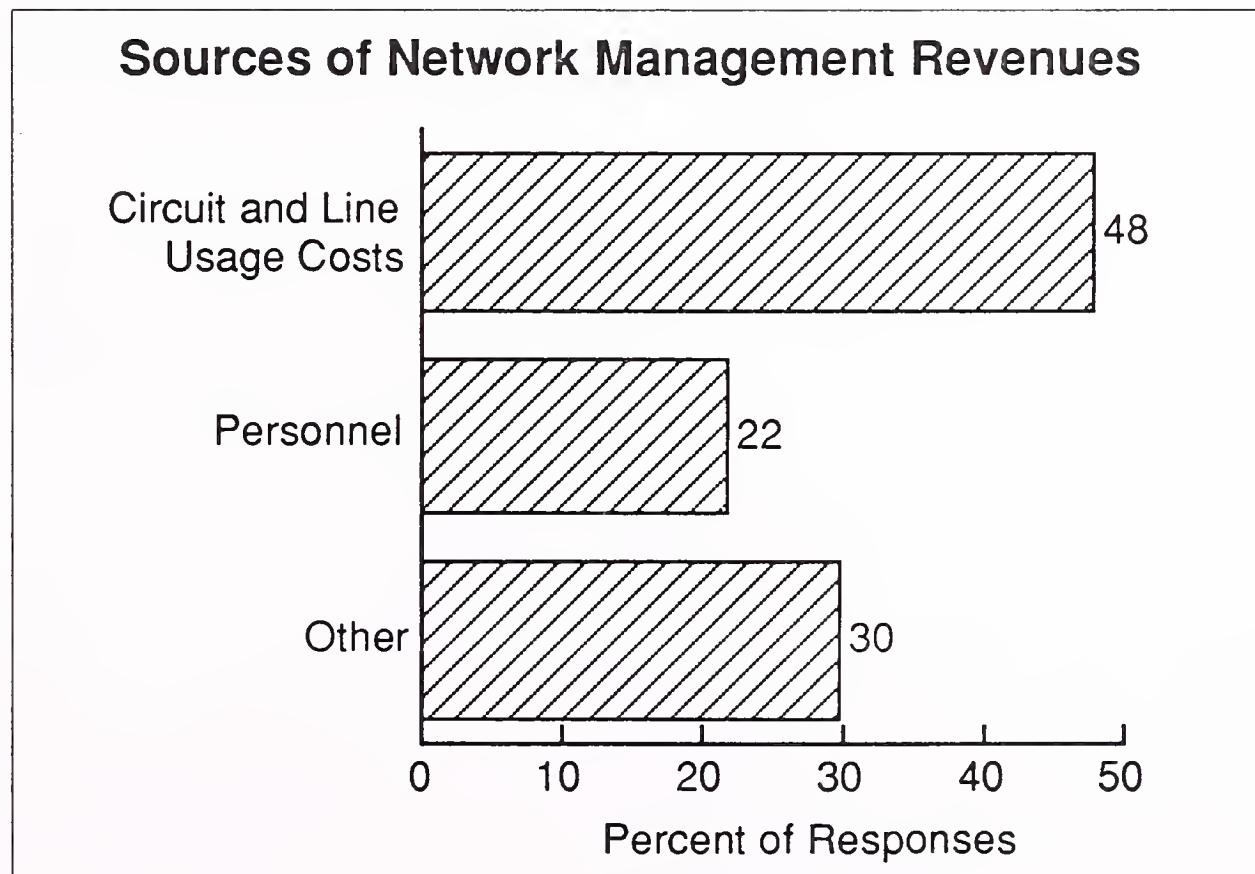
EXHIBIT IV-4



2. Network Management Expenditures

Over 80% of users surveyed for this study manage some part of their networks with in-house staff. When considering those that manage their networks in-house, users indicated that nearly 50% of their expenditures were for bearer services such as circuit and line usage charges, as shown in Exhibit IV-5.

EXHIBIT IV-5



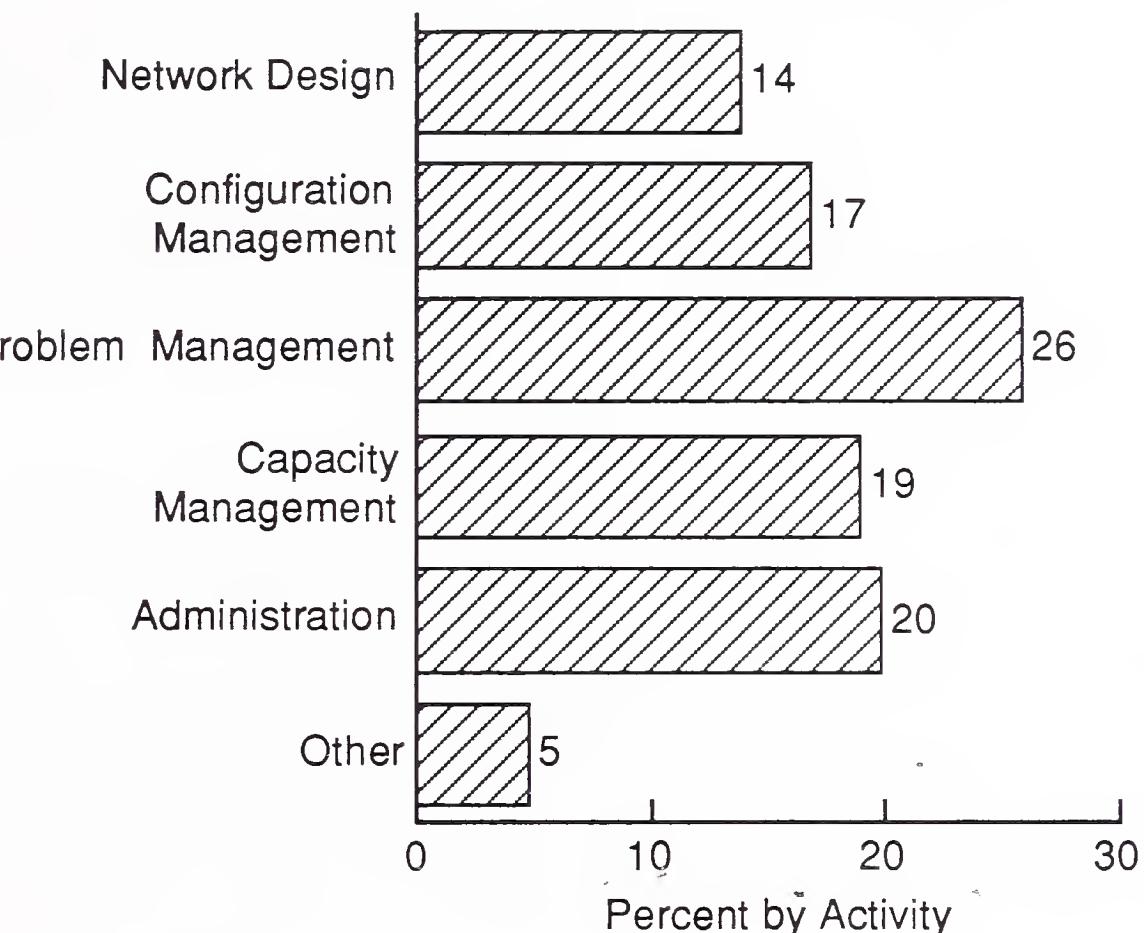
When considering the breakdown of expenses into categories and interest in network operations management, several points are important to note.

- Circuit and line usage charges are generally tariffed rates and there is frequently little room for a vendor to offer a major cost advantage over any other vendor. Saving through special options may be available, but the real advantages will be realizable by only the largest organizations.
- Some saving may be realizable in the areas of hardware cost and maintenance, but the equipment and maintenance is highly competitive and there are frequently only small margins from which savings may be made.
- The greatest savings potential is in the area of staff expenses, which can be more than 20% of an organization's costs.

When considering the breakdown of expenses by functional activity, there appears to be a reasonably even distribution among many of the activities, as indicated in Exhibit IV-6.

- Problem management, the process of identifying and correcting problems, represents an estimated 26% of the expenses. Though an increasing number of sophisticated tools are being applied, problem management remains a highly labour-intensive process.
- Problem management is also an area in which many users have the greatest concern regarding vendors. Many users believe that unless a vendor is proactively managed, it will not be as responsive to problem identification and correction. They believe, also, that proactive management can be lost when network management is outsourced.

EXHIBIT IV-6

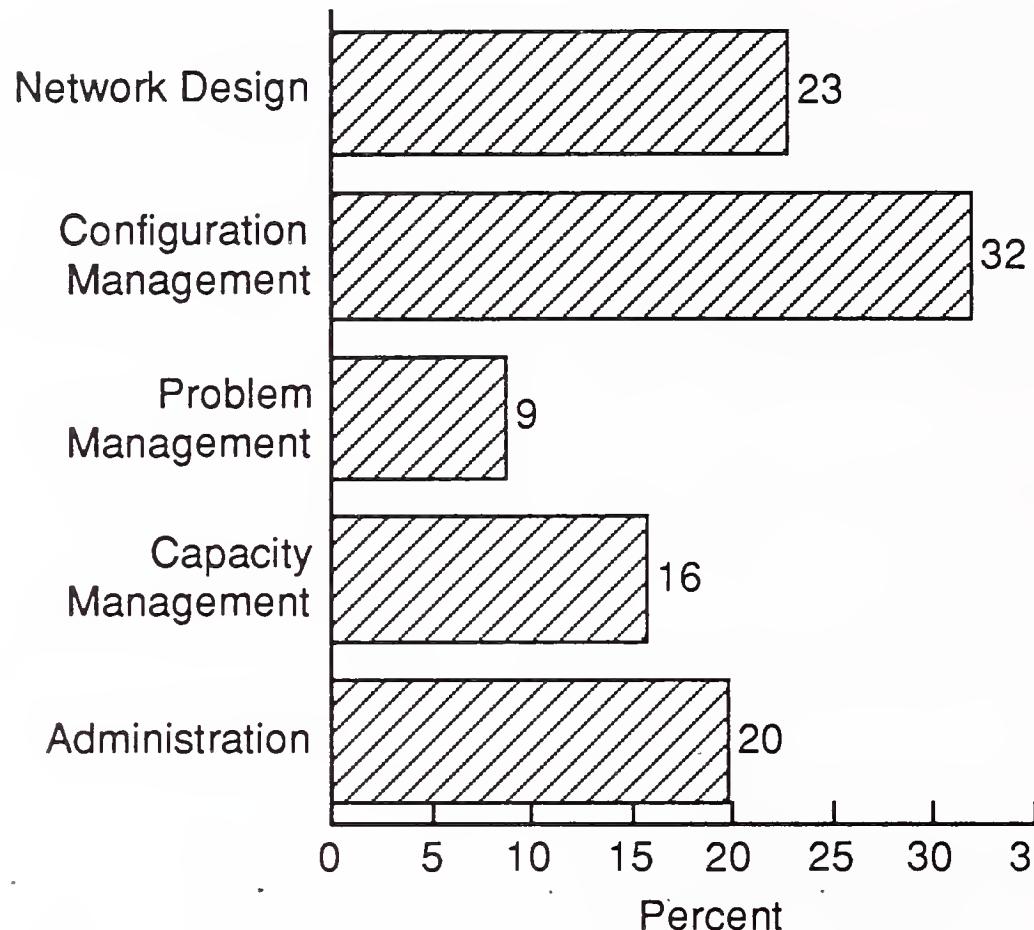
Network Management Expense by Activity

Totals do not equal 100 due to rounding.

In addition to the breakdown of internal expenses, users were asked to identify the percentage of their budgets that is for external consulting services. On average, users indicated that they spend less than 2% of their network management budgets for external consulting. The primary consulting services are shown in Exhibit IV-7.

As indicated in the exhibit, configuration management and network design are the two areas of greatest expenditure. The 20% spent for administration is primarily for billing services and the cost to install and move equipment.

EXHIBIT IV-7

Expenditures for Outside Consulting**D****Network Management Issues**

Information contained in this section is derived from previous INPUT research into user needs and requirements for network management products and services.

This section explains many of the concerns that users have today about the quality of network management products and services, and indicates problems that many vendors need to address.

1. In-house Management Capability

A key determinant of how users manage their networks is their in-house capability. Generally speaking, the largest users tend to be the best equipped, primarily by having specialized and trained people available to work on network management tasks.

There are, however, several considerations that have a direct impact on the ability of users to successfully manage their networks.

- *Staff Levels* - Few organizations, even the largest, are adequately staffed to provide the comprehensive level of expertise necessary.

- *Training* - Though there are numerous technical classes dealing with network technology and design, few classes deal with the breadth of requirements for successfully managing a complex, integrated network. Most network managers have developed their skills through on-the-job training. Vendors do provide training, but their training is considered generally inadequate and orientated only to their own products.
 - There are no signs that user training will be expanded significantly in the near future. In addition to the lack of vendor or private courses, many managers are too busy solving problems to spend time on training.
 - The lack of training has significant implications for users and vendors of network management systems. Without comprehensive training, management tools go unused and networks operate at less than optimal performance.
- *Available Tools* - Most of the tools used to manage networks are either accessories to other network equipment, such as modems or multiplexers, or are technical test equipment. Though they are beginning to appear, few network management systems in use today address more than a narrow range of network problems. In addition, using sophisticated network equipment is frequently beyond the capability of user staffs.
- *Vendor Bias* - Users generally believe that support provided by most vendors is highly biased. Training and support is frequently made available prior to a sale, but may be seriously lacking after a sale. Users believe that support is provided only for the purpose of making a sale and that vendors have little true interest in management of a network.

2. Multi-network Interface

Almost all users, even smaller ones, operate some form of multi-network environment. The most common are hybrid technologies such as switched/private line, analog/digital, satellite/terrestrial, packet/circuit-switched, etc. Few users experience problems as a direct result of the interconnection of such varied technology.

In most cases, interconnection problems occur because of vendor interfaces and are at the level of people-to-people communications between vendors. Some examples of these problems are given in the user comments shown in Exhibit IV-8.

In many organizations, frustration with vendor support has caused users to take on increasing responsibility for network management functions. The frustration has also contributed to questions from users about vendor ability to successfully manage a user's network.

EXHIBIT IV-8

Network Interconnection Problems

- We leave connecting problems up to our vendors to solve.
- Vendor coordination. Lack of communication.
- Most of the time the problems are a lack of understanding of the systems that are being connected.
- Usually don't have problems in this area except if standards are lacking or nonexistent.
- We generally do not have problems except when there are no clear-cut standards; then there are problems in all areas.
- Interfacing between vendors.
- Security.
- Physical connectivity no problem. Protocols are the problem.
- Problems in overall loss—especially in analogue systems. This is a system design problem.
- There are always problems and how you solve them depends on the situation. With the proper planning and detail work a great many problems can be avoided.
- The problems we find occur mostly on the vendor side.
- We've encountered most of our problems on the voice side.
- One vendor's engineer may inadvertently disconnect the equipment of another vendor.
- IBM software can control most of the elements but only if they are of IBM manufacture.

3. Remote Maintenance

The nature of a network requires many remote functions. Historically, this has meant either significant training for personnel at remote locations or significant expense to send people to remote locations.

With the size and complexity of networks growing, the need for management at remote locations has also grown. The major change enabling remote operations to remain manageable is the growth of intelligence in network equipment.

There are three key results from the increasing intelligence that enables equipment to be successfully managed remotely:

- *Communications capability* - Networks have always communicated through remote equipment. What has changed is that networks can now communicate directly with remote equipment.
- *Controlability* - The ability to change transmission speeds, port types, connection paths, etc., remotely has opened new opportunities for flexibility in the management of networks.
- *Self diagnosis* - The ability to examine internal components and external interfaces and to collect the results for analysis makes remote devices not simply operating components of the network, but management tools.

Although many of these capabilities are not new, the rapid advances of chip-based intelligence have expanded the capabilities significantly.

4. Integrating Local-Area Networks (LANs)

Currently, few telecommunications organizations have responsibility for LANs or for their interconnection with other networking capabilities. In most cases, this function is handled by the department responsible for the LAN. However, this is beginning to change. In some organisations the responsibility for LANs that are interconnected with other remote LANs are managed centrally, leaving standalone LANs under local control.

As the need for integrated, enterprise-wide networks becomes more acute, responsibility for LANs will become the responsibility of telecommunications and information systems organizations, compounding already complex management responsibilities.

With the integration and the shift in responsibility, there will be a need for enhanced and broader expertise, increasing the costs of network management.

5. User Requirements of Products and Services

Users indicate three major requirements of products and services. Major requirements are shown in Exhibit IV-9.

- *Usability* - The greatest problem facing network managers is the issue of usability. Users have a wide variety of tools available, but in many cases are not able to use the tools effectively. There are three frequently cited reasons for such inability.
 - The tools are complex and difficult to understand.
 - Users have not been adequately trained in the use of the available tools.
 - The majority of the tools available address only a limited set of network problems.
- *Multivendor* - Most users are faced with a requirement to deal with multiple vendors. A user will almost always have relationships with at least one equipment vendor and a PTT. The average user deals with a dozen vendors. A large user may deal with one hundred or more vendors.
 - This creates two different network management problems. One is the logistical problem of knowing which vendor is responsible for each component of the network. The other is the more complex problem of knowing how each of these vendors' products work with the network.

Many network management system vendors are addressing the logistics problem with high-quality data base systems. Few are addressing the internetworking problem.

- *Programmability* - Programmability is a growing user issue. Only the large users are equipped or even interested in doing their own programming of network management operations.
 - Smaller users do not need or want the responsibility of programming their own network equipment. Smaller users will generally obtain services from vendors that deal with software problems as part of their service.

EXHIBIT IV-9

Key User Requirements of Products and Services

- Usability
- Multivendor
- Programmability

6. Simpler Products

In addition to identifying the functions that users require from their networking products, they strongly indicate that they need simpler products.

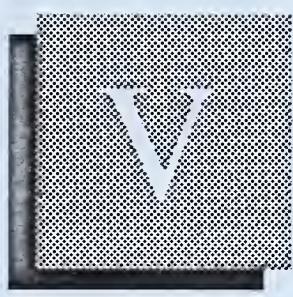
Though users recognize that network management is complex, they also do not have the time to train their staff in the complexities of using network equipment. The products that will be in the greatest demand in the future will be those that require the least amount of training.

7. Vendor Support

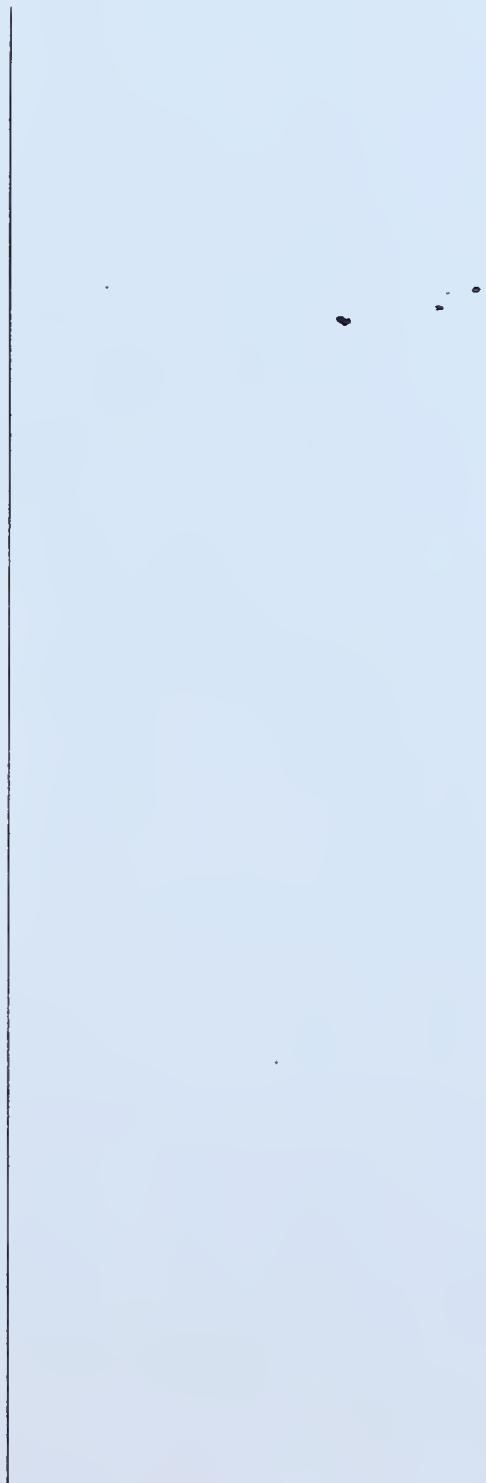
Vendor support has always been necessary for some types of product, but in telecommunications, with products distributed over a wide geographic area, vendor support is absolutely essential.

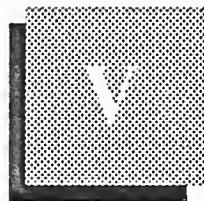
This need becomes dramatically apparent with carrier services, where users are looking not only for high-quality services but for the carriers to tell them how well these services are operating.

Proactive support—advising the customer of the current status of operations and problems before being asked—can frequently be of greater importance than the actual time necessary to resolve a problem.



Conclusions and Recommendations





Conclusions and Recommendations

A

Conclusions

This chapter provides a number of conclusions and recommendations about the market for network management services.

Numerous conclusions can be drawn from the research conducted for this report and from a review of recent industry data.

The following provides a number of conclusions that INPUT believes are most pertinent to vendors that are current providers of network management services or are considering entering this market area. The key conclusions are shown in Exhibit V-1 and discussed below.

- The market for network operations management services is complex and can be viewed in several ways.
 - Viewed as discrete subsets (voice, data, etc.), there are already a large number of network management contracts. Over time, users have contracted for management of subsets of their networks, such as voice or LANs, when required.
 - Viewed in its totality, the market has had little activity to date. Research indicates that contracting for the management of integrated networks is just beginning.
- The market is only beginning to emerge. Fostered by the emergence of systems operations management, growing concern about management of large, integrated networks, and the increasing criticality of networks to the business, users are beginning to examine alternatives to ensure the best network management service.

- However, the rate of growth may be impacted by the emergence of improved network management products. Comments suggest that the market will grow because of a lack of in-house expertise in managing integrated networks. But if improved products are able to address many of the technical issues that exist today, the need for outside services may not be as great.
- There is a significant degree of user resistance to contracting for network management services. Network managers are not convinced that vendors have the breadth of expertise necessary to manage user networks. Users also believe that vendors will not view their networks with the same degree of criticality that they do.
- Users generally do not think there are any leading vendors in network management services. Users identifying leaders generally qualified their responses, indicating that their selections were based on name recognition rather than demonstrated capability.
- The types of networks for which increased management emphasis is needed are local-, wide-, and metropolitan-area networks, but particularly networks with an international or pan-European scope.
 - Users are increasingly concerned about how to manage these types of networks effectively when they become integrated.
 - Though there is general recognition that network management products are improving, there is concern about how effective they will be in an integrated environment.
 - Tools are currently designed to manage individual network elements. What is required now is a hierarchical tool overseer tool.
- There are indications that systems operations vendors are in a strong position to provide network management services. Vendors that have proven their ability to manage a user's information systems operations will have established a successful track record when the need for network management becomes apparent. This is particularly true in the public sector, where systems and network operations management are already more accepted.

EXHIBIT V-1

Conclusions

- Market is complex
- Market is emerging
- Significant user resistance to outsourcing in short-term
- No leading vendors
- International networks are where the greatest need is
- VANS providers and systems operations vendors strongly positioned
- Personnel issues are a problem

B**Recommendations**

As indicated in the conclusions, the market for network management services is just beginning to emerge. The recommendations are therefore orientated towards the vendor who wishes to become a leader in this emerging market. A summary of the recommendations is given in Exhibit V-2 and discussed below.

- The need for vendors to broaden their base of skills was a frequently mentioned need in the surveys that supported this study. To be able to effectively manage large, integrated networks, vendors need to be able to demonstrate expertise in voice networks, local-area networks, and long-distance data networks. The technical expertise for each is different, and a vendor that is strong in one or two of the three areas may not be able to compete successfully for management of integrated networks.
- Vendors must be able to demonstrate previous success. Users are concerned about vendors' ability to manage large, integrated networks. Those able to demonstrate success in managing comparable networks will be in a better position to compete for large contracts.
- Users have significant concern about losing control of their networks. Successful vendors will be ones that can provide users with an understanding of how the network is being operated and can build user participation into the operational process. The issue is as much one of visibility and understanding as decision making.

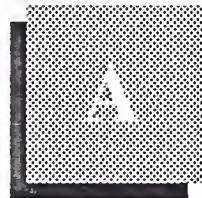
- Vendors need to demonstrate proactive support. Successful vendors will be ones that advise users of problems and keep them apprised of progress in resolving problems. User satisfaction with the vendor declines sharply when the user has to advise the vendor of a problem or has to follow up on problem resolution.
- Vendors should get to know the end user. End users are now more often in charge of expenditures and are in strong positions to influence the decision to contract as well as the vendor selection.

EXHIBIT V-2

Recommendations

- Broaden skills base
- Institute training programmes
- Demonstrate success
- Build in user control
- Demonstrate proactive support
- Get to know the end users

Appendix



Appendix: User Questionnaire

NAME: _____

TITLE: _____

COMPANY: _____

First, we would like to get some background understanding of network management in your organization.

1. In your organization, does network management include both voice and data communications?

Yes (Go to Question 4)
 No

2. Who has responsibility for managing voice communications?

Operating Division or Department
 Administrative Department
 Other (Specify _____)

Name of possible Voice Respondent

3. Do you expect that responsibility for voice communications will be 'integrated' with responsibility for data etc. within the next five years?

Yes No

4. Are any of or any part of your networks managed by an outside contractor?

Some All by Outside Contractor
 Some All In-house

(Go to Part II, if 100% by Outside Contractor)

In-house

5. Please tell us what part of the organisation has the primary responsibility for managing your data networks.

Corporate Information Systems
 Division or Department
 Administrative Function
 Other (Specify _____)

6. Please tell me what are the approximate amounts of your annual expenditures for corporate telecommunications and DP/IS.

Local Curr.= Amount T/comms. DP/IS
Voice Data/Both

<input type="checkbox"/>	<input type="checkbox"/>	\$500,000 or less	
<input type="checkbox"/>	<input type="checkbox"/>	\$500,000 to \$1 M.	
<input type="checkbox"/>	<input type="checkbox"/>	\$1-5 M.	
<input type="checkbox"/>	<input type="checkbox"/>	\$5-10 M.	Growth Rate pa.
<input type="checkbox"/>	<input type="checkbox"/>	\$10-20 M.	Budget <input type="checkbox"/> %
<input type="checkbox"/>	<input type="checkbox"/>	\$20-50 M.	
<input type="checkbox"/>	<input type="checkbox"/>	Over \$50 M.	Traffic <input type="checkbox"/> %

7. Of your total expenditures, please estimate the percentage for each of the following (Interviewer Note: Total should equal 100%. Try to get percentage estimate even if expenditure information was not provided).

Voice Data/Both

_____ %	Circuit, access or usage charges
_____ %	Hardware (modems, multiplexers, PBX, etc.)
_____ %	Maintenance of network hardware
_____ %	Staff (comms. systems/operators)
_____ %	Outside consulting, other services
_____ %	Other (specify)

8. Please estimate the percentage a) of your staff's time, and b) of external consulting expenditures, that are spent for each of the following functions . [The totals should equal 100%.]

		a	b
		Own Staff	External
Network design		_____ %	_____ %
Configuration management		_____ %	_____ %
Problem management		_____ %	_____ %
Network administration	(e.g. billing, inventory control)	_____ %	_____ %
Capacity/traffic management		_____ %	_____ %
Other (specify)		_____ %	_____ %

Do you agree with these categories of work?

9. What network management tools do you use?

a. WANs

b. LANs

10. How satisfied are you a) with the performance of these tools and b) with the vendors marketing them? [On a scale of 1 to 5, in both cases]

a) _____ b) _____

11. Have you considered having an outside contractor assume full responsibility for managing your network(s)?

Yes
 No

Comment

12. What types of changes (internal or external) might cause you to consider contracting with a vendor to manage your networks in the future?

13. If you were to contract with an outside vendor to manage your network(s), how well do you think each of the following types of vendors would be able to meet your needs? [Please rate each on a scale of 1-5 (1 is lowest)].

- Network hardware vendor (Siemens, Alcatel, NET, Timeplex, etc.)
- VANS provider (Infonet, GEIS, Transpac, etc.)
- PTT/Common carrier (France Telecom, DBP Telekom, BT, AT&T, MCI, US Sprint)
- Independent systems vendor or communications consultant, etc. (SD-Scicon, Arthur Andersen, CGS)
- Computer equipment vendor (DEC, IBM, Unisys, etc.)

14. In your judgment, who are the leading vendors of network management services (top three)?

(i) _____

(ii) _____

(iii) _____

GO TO Part III, IF NO OUTSOURCING

Part II

Outside Management/Outsourcing

INPUT uses the term outsourcing to describe the situation where the whole or large chunks of responsibility/work are being contracted out.

15. Please indicate which of the following types of networks are included in the vendor's contract.

Voice
 Data, local-area (LANs)
 Data, wide-area (WANs, MANs)
 International voice or data networks
_____)

16. How long have you had your networks managed by an outside contractor?
Since _____

Less than 1 year
 1-2 years
 2-3 years
 3-5 years
 Over 5 years

17. Please identify which of the following functions are included as part of the vendor's contract.

Transmission facilities
 Network design
 Configuration management
 Problem management
 Network administration (e.g., user billing, inventory control, etc.)
 Capacity/traffic management
 Other (Specify) _____

18. Could you indicate the estimated annual percentage saving that you expected/achieved through contracting with an outside vendor?

Expected _____ % Achieved _____ %

19. How is the vendor paid—i.e., on the basis of savings realized, a flat fee, or other?

Savings
 Fee
 Other (Specify) _____

20. Is the network managed from your site or from the vendor's site?

Own site,
 Vendor's site

21. How satisfied are you with your external vendor's performance?
[Please use a scale of 1 to 5. 1 equals lowest score]

22. Do you have a contract with a vendor to manage your information processing operations in addition to your network?

Yes
 No (Skip to Part III)

23. Is the vendor for network management and for information processing the same vendor? If not, why not?

Yes
 No

24. Could you identify the key reasons you contracted with a vendor for network management (top three reasons)?

Financial decision - cost savings
 Strategic decision (In what ways?)
 Other (Specify) _____

Part III

25. What are your major concerns? (top three, please)

26. Do you think that outsourcing is/will become a trend with users for management of their networks?

Yes
 No

Why? _____

27. Worldwide revenues (1990) _____

European revenues (1990) _____

Staff Numbers Europe all depts. _____

Europe IS Dept. _____

of which Data/Telecomms _____

THANK YOU

If we can have your correct address, we will be pleased to send you a copy of the executive summary when the report is complete.

Address
